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LIVESTOCK AND THEIR ENVIRONMENTS: SUNLIGHT AND VITAMIN D

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PART I

Summary

Astrophysical measurements of the intensity of the ultra-violet fraction of sunlight and biological investigations of the antirachitic power of ultra-violet light are to be found in the literature. The data have been combined with astronomical observations of the altitudes of the sun at different times and in different places, from which it has been calculated that with normally cloudless skies the annual amounts of vitamin D which may be derived by direct solar irradiation of the skin will not exceed the following values for latitudes 30°, 40°, 50° and 60° N., respectively: 1,200, 850, 600 and 350 I.U. of vitamin D per sq. cm. of surface measured normally to the incident rays.

Not less than some two-thirds of the sun's daily antirachitic power is concentrated into the four hours 10 a.m. to 2 p.m., regardless of latitude or time of year.

In latitudes 50° and 60° N., the potency of direct sunlight during the months of November to February, inclusive, is very small.

Examination of meteorological data for the British Isles (lat. 50° to 60° N.) suggests that clouds and other adverse climatic factors reduce the annual totals given above to 220 and 130 I.U. of vitamin D per sq. cm., respectively, for the relevant latitudes.

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For the better part of a century Claude Bernard's dictum* concerning the importance of the internal environment to the living animal has been freely quoted. When, however, one considers phenomena such as the relationships of piglet anaemia to housing, of the immune bodies of colostrum to the organisms of the environment, of energy requirements to air temperature, or of sunlight to vitamin D and the metabolism of calcium and phosphorus, sharp differentiation between internal and external environments has to be abandoned, convenient though it may be to review each of them separately.

Experimentally it is usually easier to investigate the effects on the organism of modifications of the internal, rather than of the external, environment. This, however, is of little assistance where the problems of livestock production are being examined, for in such instances one meets with factors, geographical and climatic, which are inherently incapable of reproduction within the four walls of a laboratory, although much help may be derived from relatively simple, small-scale experiments in the laboratory. The variations to be met with in the field are in fact so great that the collection of *all* the data needed, for example, for studying the relationship of sunlight to animal health in Britain is impracticable and probably impossible: most likely it is also unnecessary. In consequence, rather fragmentary information from very diverse sources has to be applied to a study of the effects of changes of the external environments upon livestock.

In this and subsequent papers the inter-relationships between sunlight, vitamin D and livestock are reviewed under the following main headings: (1) the production of the vitamins D by the irradiation of suitable precursors; (2) the effects of latitude and geographical location on solar radiation at ground level; (3) the influence of vitamin D on the metabolism of mammals; (4) the vitamin D content of animal feeding-stuffs; (5) the total amounts of the vitamins D, of direct solar and dietary origins together, available to livestock; (6) animal husbandry, especially in Great Britain, in relation to the previous factors and (7) wider aspects of vitamin D in relation to animal health.

* "La fixité du milieu intérieur est la condition de la vie libre."

(1) THE PRODUCTION OF THE VITAMINS D BY IRRADIATION

Bicknell (1942) has commented: "the early history of vitamin D is the history of (human) rickets." That cod-liver oil could cure rickets and its disfiguring malformations of the bones of children had been known for at least 200 years, yet it had almost been forgotten by the end of the 19th century, even though the cure of captive lion cubs in 1898 showed the possibility of its wide application to animals of different species.

By 1919 Mellanby had produced experimental rickets in puppies, using a diet from which fat had been removed: in opposition to this a second set of workers believed that environmental factors, such as fresh air and sunlight, were paramount in the cure of rickets (Ferguson, 1918). Within about five years, however, Huldschinsky (1919) had cured rickets in children by using ultra-violet light from a mercury-vapour lamp, Chick (1923) had reported that either sunlight or suitable food could be effective and several workers (Hess, 1924; Steenbock, 1924; Hume, 1924) had cured rachitic animals using irradiated "foods." The problem was thus in part resolved: sunlight could act either directly on an animal or indirectly upon its food.

Mellanby's results were linked with the others by the discovery that it was the lipoid part of foods which could acquire antirachitic properties by irradiation, and soon afterwards the sterol fraction of fats was shown to be the one concerned. By suitable irradiation of a plant sterol, "calciferol" or vitamin D_2 was produced and eventually isolated in pure form, while the examination of certain fish-liver oils led to the isolation of a new "vitamin D." Of some seven chemically closely related compounds now known to possess antirachitic properties in common, only the two mentioned above appear to be important.

During the period 1925–35 laboratory experiments indicated the wavelengths of light which are needed for the synthesis of vitamin D *in vitro*; they revealed also that excessive radiation, a possibility in the laboratory but perhaps less likely in the field, could destroy the vitamin.

With regard to animals, Clark (1933), using rats and chicks on a rachitogenic diet, concluded that no radiation of wavelength greater than 3,130 A° could cure rickets and that only waves of 3,050 A° or less were powerfully active. Such experiments established moderately well the upper limit of wavelength of sunlight for therapeutic activity.

During this time and, indeed, until very recently, work on vitamin D has suffered from one severe disadvantage, namely, the lack of a simple physical or chemical method for its estimation. Even now (Green, 1951) the problem is far from a satisfactory solution, with the result that biological methods

of measurement have had to be used for much of the research. Since, however, comparatively large numbers of animals, *e.g.*, 40 or more for a "four point" assay, are needed for accurate estimations, the work has been limited very largely to the use of young rats or chicks, the cost of the employment of the domesticated species of livestock being normally too great. There are, unfortunately, well-established species differences with respect to some kinds of response after the administration of vitamin D and, since livestock may acquire their vitamin D either by solar irradiation or from food—or more commonly from a combination of both—one is often confronted by such difficult problems as, for example, to assess the value of sunlight for cattle in Britain on the basis of work in Baltimore (U.S.A.) or Cape Town, where rats were exposed to the sun's rays; or to estimate the oral dosage needed for sheep from a consideration of the results of the irradiation of another species in a different part of the world. These may seem to be extreme examples, but they illustrate the difficulties of field, as opposed to laboratory, work. Difficult though the problem may be, however, there appear to be no *a priori* reasons why fairly accurate assessments, including a safe margin for error, should not be made, but, as must be re-emphasised, the evidence needs to be gathered from very diverse sources.

It is unfortunate that the spate of early work on the relationship of sunlight and short-wave radiation to vitamin D, which led to the introduction of a section entitled "Irradiation" in *Nutrition Abstracts and Reviews*, should have shrunk to an inconsiderable trickle more than 10 years ago, as if to suggest that all of the relevant problems needing investigation had been solved. Even within the limits of laboratory experimentation, however, there are many aspects of the metabolism of vitamin D requiring elucidation, while the ever-varying methods of livestock production, more fundamentally affected than ever before by the events of the last decade, necessitate regular review of the part played by sunlight and vitamin D *in the field*.

(2) The Effects of Latitude and of Geographical Location on Solar Radiation at Ground Level

(*a*) *The relative spectral distribution of solar energies in the ultra-violet region.*

In classical experiments carried out at Marseilles, Fabry and Buisson (1921) used quartz prisms to disperse the ultra-violet component of sunlight, so that rays of different wavelengths were recorded photographically during the rising and setting of the sun. The greater the energy associated with a given wavelength in the sunlight, the denser was the image produced on the photographic plate. For reference purposes radiation produced in the laboratory and having known energy values was also photographed. In this way the different relative energies associated with particular lines of the solar ultra-violet spectrum and with different altitudes of the sun were measured.

In these experiments the lowest and highest altitudes of the sun for which records were made were 40° and 68° respectively; throughout that range of altitudes the relationship between the logarithm of the intensity of ultra-violet solar radiation of a given wavelength at ground level and the secant of the angle of deviation of the sun from the zenith (*i.e.*, solar altitude of 90°) was linear. On the assumption, perhaps justifiable by the nature of the experimental results, that the relationship would continue to be linear for solar altitudes less than 40° and greater than 68°, the intensity of the ultra-violet radiation of a given wavelength can be expressed by means of the equation

$$\text{Log } I = A - b \sec \quad \ldots\ldots\ldots\ldots \text{(i)}$$

"A" and "b" being constants for the wavelength in question and "z" being the angle of deviation of the sun from the zenith.

Algebraic solution of the equation, or the extrapolation of the experimental curve to z equals 0°, gives the intensity of the radiation of a given wavelength at the surface of the earth when the sun is overhead. If the logarithm of that intensity be denoted by Log Ig, then A, which is the logarithm of the intensity of that particular radiation before it enters the earth's atmosphere is given by

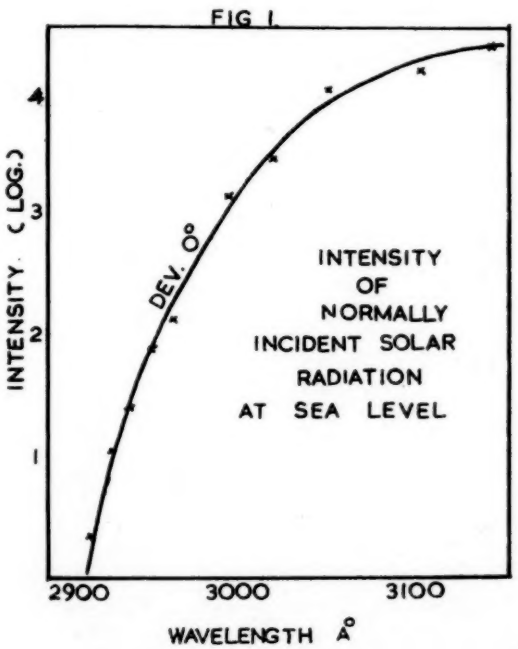
$$A = \text{Log Ig} + b$$

Calculations of the various values of A for ultra-violet radiation of different wavelengths, within the limits 2,900 A° to 3,150 A°, give figures of 5·1 to 5·4. There is thus comparatively little difference between the respective energies associated with ultra-violet radiation of different wavelengths before sunlight enters the earth's atmosphere.

The values of "b," however, increase rapidly with diminishing wavelength, from 0·84 for 3,143 A° to 5·08 for 2,917 A°; moreover, the sign of "b" in equation (i) is negative. "b," which has been described as the logarithmic "opacity" of the atmosphere for light of the given wavelength, is the sum of three components. When radiation passes through a gas there is a general loss of intensity which can be calculated from physical principles; additionally, in certain cases, as when sunlight passes through coloured gases or ultra-violet light passes through ozone, there is also selective absorption from rays of particular wavelengths. In both of these effects the proportion of energy lost is a function of wavelength. Lastly, the passage of radiation through dust, water vapour and those factors which together are described as "haze" also leads to the loss of radiant energy. Fabry's results (*op. cit.*) were consistent with this third loss being independent of wavelength, within the limits he was studying. In the case of wavelength 3,143 A°, "b," having the value of 0·84, was made up of the three components, 0·86, 0·23 and 0·25, associated with the three causes given above.

Fabry found that by far the greatest influence on the magnitude of "b" was the ozone layer in the upper atmo-

FIG. I.



sphere ; it was particularly marked with radiation of the shorter wavelengths. The effects of the value of " b " on the nature of the radiation reaching ground level when the sun is at zenith, are best illustrated by Fig. 1, where the logarithms of the intensities of the normally incident rays have been plotted against wavelengths, giving rise to a smooth curve. As the ordinates are logarithms, differences of 1, 2, 3 and 4 on that scale correspond with 10-, 100-, 1,000- and 10,000-fold variations, respectively, of energy. The great diminution of intensity of the shorter, ultra-violet waves, especially those below 2,975 A° is markedly apparent.

It is the same logarithmic opacity, " b," which causes still further, and selective, loss of potency of the shorter waves, as the altitude of the sun changes. When the sun is overhead, secant z has the value 1·00 ; when the sun's altitude is reduced to 30°, secant z is 2·00, while, with further falls in altitude, secant z increases at an increasingly rapid rate. This phenomenon is illustrated by Fig. 2, drawn from the data of Fabry and Buisson (*op. cit.*). As the sun sinks from an altitude of 30° to about 20°, the intensity of radiation of wavelength 3,143 A° decreases about 10-fold (antilog. of 0·84) but the change in 2,922 A° is approximately 100,000-fold shrinkage (antilog. of 4·82).

These data illustrate the great differences there are at ground level between the amounts of energy furnished by the ultra-violet fraction of sunlight due to the varying altitude of the sun. Since variations of solar altitude are met with (i) at different times of day at the same place, or (ii) at the same time of day in the same place but at different seasons of the year, or (iii) in places of different latitude (at sea level) at identical times, there must be corresponding variations in the ultra-violet potency of sunshine.

(*b*) *The relative vitamin D producing capacities of radiation in the 2,800 to 3,150 A° band.*

So far as livestock are concerned, the respective efficiencies with which equal amounts of energy derived from solar rays of different wavelengths can convert the precursor of vitamin D into the true vitamin *in vitro* are of little consequence, for such anatomical and physiological factors as the nature of the hair and skin of living animals, factors which will be considered later, are interposed between sunlight and the vitamin. Ideally, data would be available for all species, but information as to the efficiency of utilisation of radiant energy in livestock is in fact limited principally to the chick and the rat.

Knudson and Benford (1938), using quartz apparatus so that the ultra-violet light from an artificial source could be separated into its different wavelengths, applied different rays in turn to the shaven backs of rats. The rats being on a rachitogenic diet, there was healing of the bones in proportion to the amount of vitamin D produced by irradiation of the animal. Thus the efficiencies with which energy from rays of different wavelengths is used in vitamin D synthesis were assessed. The data of Knudson and Benford are reproduced in Fig. 3. Considerable variations in relative efficiency were observed, radiation of wavelength about 3,128 A° being only about 1 per cent. as efficient as 2,804 A°.

(*c*) *The spectral distribution of the vitamin D producing capacities of sunlight.*

These results enable the data of Fabry and Buisson to be translated into potential vitamin D units. If, for example, the most potent radiation is given the relative value of unity, then that of 3,143 A° is 0·01, of 2,900 A° is 0·57 and so on. Since equation (i) gives energies in logarithmic form, the logarithms of the relative efficiencies are added to the various values of Log I corresponding to rays of different wavelength and for the sun at varying altitudes. In the case of radiation 3,104 A° the value of A in equation (i) is approximately 5·17 in terms of energy ; the efficiency of that radiation for vitamin D synthesis is 0·11, the logarithm of which is $\overline{1}$·04. With respect to vitamin D producing powers in the rat, the value of radiation of wavelength 3,104 A° in sunlight at ground level can thus be expressed as follows

$$\text{Log P} = (5{\cdot}17 + \overline{1}{\cdot}04) - \text{b sec. z}$$

or, since the value of " b " for such rays is 0·99 according to Fabry and Buisson (*op. cit.*)

$$\text{Log P} = (5{\cdot}17 - 0{\cdot}96) - 0{\cdot}99 \text{ sec. z}$$
$$= 4{\cdot}21 - 0{\cdot}99 \text{ sec. z} \quad \ldots\ldots\ldots \text{(ii)}$$

which can be solved for the various values of z between 0° and 90° to give the logarithm of the estimated vitamin-producing capacity, P, of this fraction of sunlight.

FIG. 2

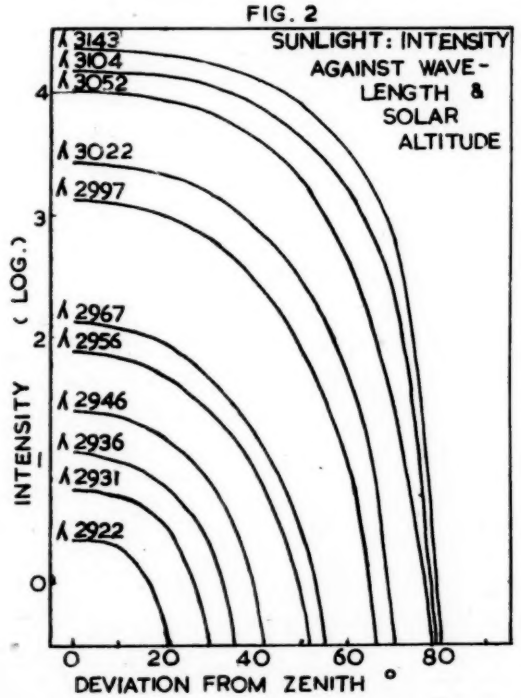
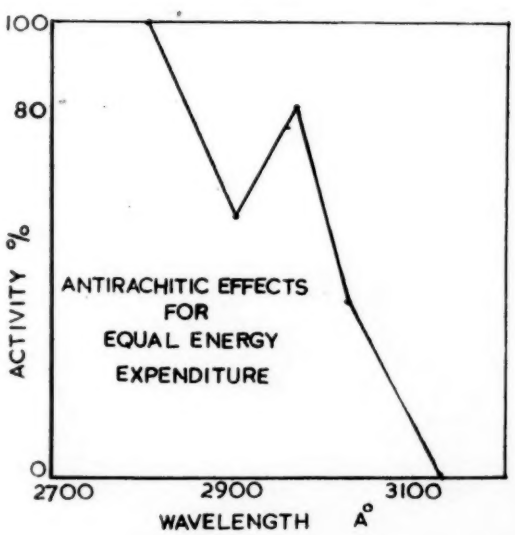


FIG. 3



When Fig. 1 is re-drawn (Fig. 4) using potential vitamin-producing power, P, as the ordinate instead of simple energy, a different type of curve is produced, with a peak about 3,050 A°, indicating that for normally incident sunlight, radiation of about that wavelength is the most important for vitamin D synthesis, the rays of longer wavelength having higher energy values but being disproportionately inefficient. The shape of the curve suggests that radiation of wavelength up to about 3,200 A° may be active in sunlight, though the total activity beyond 3,150 A° is small.

These equations are sufficient to enable one to calculate to a first approximation the relative biological value of the shorter wave component of sunshine. The method may be illustrated by the following example. It is assumed, with only a slight error, that sunlight provides a continuous band of radiation, from 3,143 A° down to about 2,900 A°. For various

FIG 4.

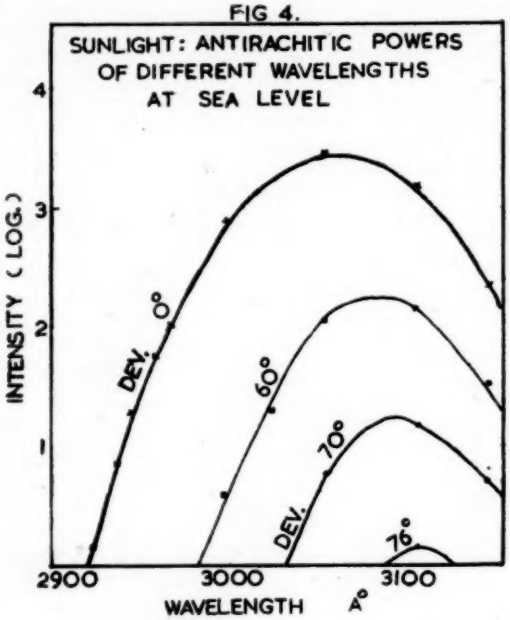


FIG. 6

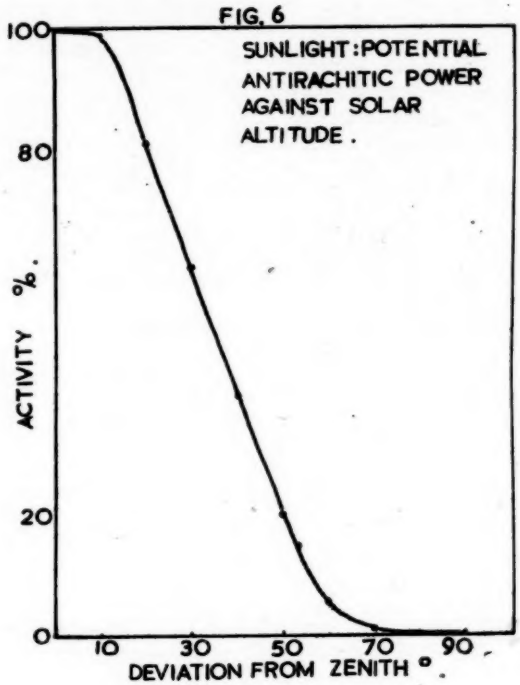


FIG. 5

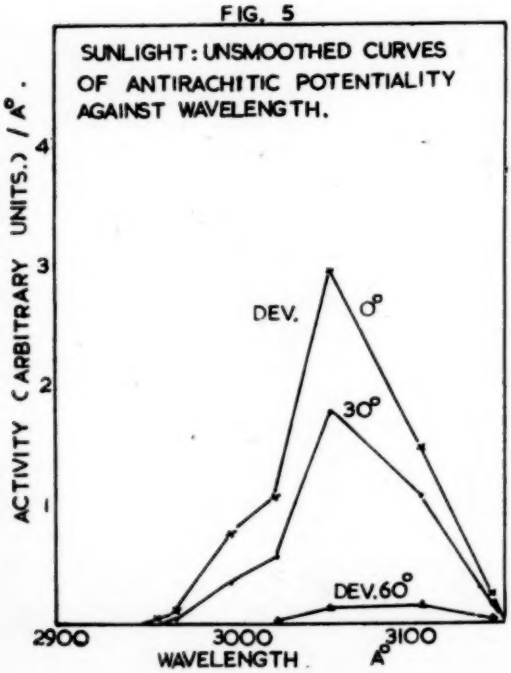
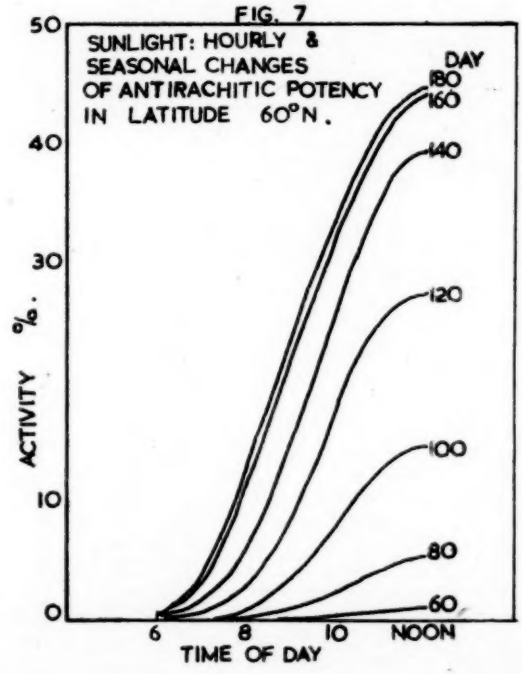


FIG. 7



values of the angle z, the corresponding values of Log P for light of different wavelengths are calculated, using the appropriate form of equation (ii). Using P, in arbitrary units of vitamin D/cm. sq./sec./A°, as ordinate and wavelength as abscissa, the various values of P are plotted against wavelength in A°, Fig. 5. The *total* effect of solar radiation at ground level for any given value of " z " is then proportional to the area bounded by the curve joining these points and the abscissa.

In this way Fig. 6, showing the potential power of such sunlight for various values of " z " is drawn. Of note is the slight change of potency for values of " z " between 0° and 10°, the steep slope between 10° and 55°, and the low potency of sunshine when z = 55°, *i.e.*, when the elevation of the sun is 35° or less. Tisdall and Brown (1928) among other workers have pointed out the relatively poor antirachitic value of sunlight when the sun does not rise above 35°.

Tables are available (Benford, 1947) which show the elevation of the sun at different times of the day and at different seasons for places of known latitude. Using Fig. 6 the various elevations can be translated into terms of vitamin D potency of sunlight at ground level. Thus, for latitude 60°, a graph showing relative potency against time of day for different seasons of the year may be drawn, Fig. 7. The areas bounded by the abscissa (time axis) and the curve are proportional to the total amount of useful radiation received during the day at given times of the year.

The plotting of total radiation against time (in days) for a point of fixed latitude, enables one to estimate the potential value of sunshine there throughout the whole year, the area between the time axis and the curve being proportional to that value. In Fig. 8 are shown the curves for the half year for latitudes 30°, 40°, 50° and 60° respectively (the curves for the second halves of the year are almost identical but declining instead of rising and therefore have not been drawn).

Using such a method of calculation, one could not expect accuracy of a high order, but Fig. 8 shows that the amounts of radiation, useful for the *in vivo* synthesis of vitamin D at ground level and during the full year, are approximately in the ratios of 3·5 : 2·5 : 1·75 : 1·00 for latitudes 30°, 40°, 50° and 60° respectively (Equator, app. 4·7).

Moreover, with regard to the hourly distribution of the potentially biologically active component of sunlight, three-fifths or more of all activity occurs between the hours of 10 a.m. and 2 p.m., as shown by the data of Table I.

TABLE I

PERCENTAGE OF ANTIRACHITIC ENERGY SHED BETWEEN 10 A.M. AND 2 P.M.

Lat. °N.	Day of year 0	20	40	60	80	100	120	140	160	180
30	84	80	79	76	75	72	70	68	67	65
40	91	87	80	77	75	73	71	69	68	66
50	—	—	87	77	76	74	70	68	63	57
60	—	—	—	87	80	78	78	69	61	59

This concentration of activity within the few middle hours of the day seems to have been recognised in a general way by several groups of workers without their having given quantitative expression to it, although Manville (1937) mentions the fact that half of the ultra-violet effect is felt between 10 a.m. and 1 p.m.

(*d*) *The spectral distribution of absolute solar energies in the ultra-violet region.*

The results given by Fabry and Buisson relate to a small number of the many possible wavelengths in the ultra-violet region of sunlight. Though they help to show the shape of the energy-wavelength curve, other information is needed concerning the absolute, rather than the relative, value of the total energy enclosed by the curve (Fig. 5). Using screens to filter off all solar radiation above a given wavelength, many observers have attempted to measure the total energy associated with a selected waveband. On account of the rapid fall at sea level in the energies for radiation of the 2,900 to 3,150 A° band (as shown by Fabry & Buisson), this is a most difficult operation. Failure to cut off sharply at the chosen upper limit in the ultra-violet range brings in slightly higher wavelengths of high energy values, and thus distorts the results considerably. Moreover, since the higher wavelengths tend to be those of very low biological activity, the distortion is all the more serious. For this reason the value of 240 ergs/cm. sq./sec. for the total energy of radiation within the limits 2,900 to 3,100 A° (when the sun is at zenith) has been accepted (Forsythe & Christison, 1929). A considerably higher figure of 840 ergs/cm. sq./sec., reported by Coblentz and Stair (1931) for the band 2,900 to 3,130 A°, but possibly too high for the reasons given, will be considered later, however.

Using the former figure, the unit used by Fabry and Buisson for relative purposes may be given the absolute magnitude of $2{\cdot}8 \times 10^{-4}$ ergs/cm. sq./A°/sec.

This, in conjunction with the biological values of Knudson and Benford (*op. cit.*), enables the data already available in terms of energy to be converted into equivalent amount of vitamin D. The units of the ordinate of Fig. 6, for example, then have the value of $3{\cdot}1 \times 10^{-6}$ I.U. of vitamin D/cm. sq./sec.

Some further significant conclusions with respect to both relative and absolute vitamin D producing powers of sunlight may now be drawn. In Table II (over leaf) are shown the calculated maximum values for the noon sun at different times of the year in places of different latitude.

FIG. 8

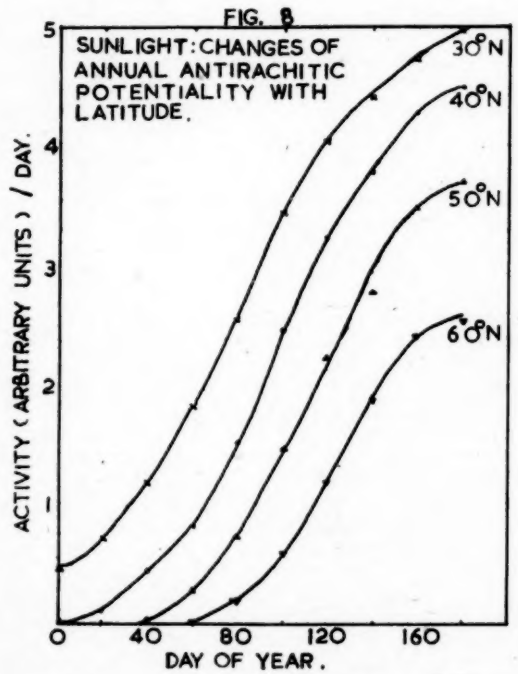


TABLE II
I.U. × 10^{-6} OF VITAMIN D/CM. SQ./SEC.

Lat. N.	Day of year 0	20	40	60	80	100	120	140	160	180
30	43	60	90	129	183	231	277	294	296	297
40	9	13	33	64	117	166	214	241	294	297
50	—	2	6	21	52	99	147	174	201	204
60	—	—	—	3	16	44	83	118	132	134

The great disparity between the powers of the sun in mid-summer and in mid-winter was shown by Day (1932), who found at Arkansas (lat. 35° N.) that five minutes' exposure of rats to sunshine during the middle hours of the day had as good an effect as 168 minutes in December. The differences observed by Mayerson and Laurens at New Orleans (1932) (lat. 30° N.) using both rats and chicks were much smaller ; their significance is discussed elsewhere (p. 157). Smith *et al.* (1941), at Tucson, Arizona (lat. 32° N.) demonstrated the existence of 10-fold differences for rats between the potencies of summer and winter sunshines. At this juncture it may be noted that the exposure of ergosterol to sunlight in Hungary for five-hour, daily, periods gave a product having a potency of 3,000 units of vitamin D per mg. in June against 15 units per mg. in January, a 200-fold difference (Jendrassik, 1934). Many observers, using physical rather than biological methods, have shown that the ratio of solar energies is of the order of 10, *e.g.*, the ratio found by Dorno (1927) at Davos in Switzerland (lat. 47° N.) was 12.

Such experimental values as have been recorded, therefore, do not always show quite the disparity between mid-winter and mid-summer potencies of sunlight as is suggested, save for the case of latitude 30°, by Table II. The possible causes of the disparity will be dealt with later ; for the moment the data of Table II may be regarded as possible maxima, which, in some circumstances, may not be attained.

The areas bounded by the curves and the abscissa of Fig. 8 are proportional to the possible amounts of vitamin D which may be synthesised by sunlight under appropriate conditions. For the latitudes given the values for vitamin D, in I.U./sq. cm./year are as follow : latitude 30°, 1,200 ; latitude 40°, 850 ; latitude 50°, 600 ; and latitude 60°, 350 (Fig. 8).

(*e*) *The effects of climate and geographical factors.*

The data quoted represent maximal values for anti-rachitic potency due to the effects of *direct* sunlight. In order that the results may be translated into their equivalent values for particular regions, it is necessary to have relevant information of the times of the day and of the year when conditions exist for which the calculated maximal values are valid. Measurements of the duration of " bright sunlight " have been carried out in Britain and in other countries for many years.

In Britain the Campbell-Stokes instrument is used " in which the duration of sunshine is recorded in the form of a scorched or burnt line traced on a graduated card by means of a spherical lens acting as a burning glass " (Air Ministry Rep., M.O. 408). Since a glass sphere is employed which is almost opaque to ultra-violet radiation, the hours of sunshine merely give an indication of when meteorological conditions are such that *some* of the ultra-violet fraction of sunlight may reach ground level.

Inspection of the data from the many meteorological stations in the British Isles (M.O. Rep. 408) leads to the following conclusions : (i) for none of the 40 stations between the latitudes 55° and 60° is there sunshine for as much as 40 per cent. of the possible time for *any* month of the year and at only about 12 of such stations does the average for the six summer months attain—and barely attain—33 per cent. ; (ii) none of the 158 stations between 50° and 55° can show a single monthly average greater than 51 per cent., four southern stations in fact each recording one such month of 50 or 51 per cent. ; (iii) for much of the British Isles, save for a narrow strip in the extreme east and south, the average for the six summer months lies between 33 and 40 per cent., the more favoured regions within the strip averaging 40 to 49 per cent.

Sunshine too feeble to produce a scorch mark on a recording card is unlikely to contribute any direct ultra-violet component, a conclusion which the results of Laurens and Mayerson (1933) support, these latter observers recording that through the disappearance of a few " cirrus clouds . . . in the vicinity of the sun . . . the energy (UV) increased over 11 per cent."

The need arises therefore for trying to take into account the loss of ultra-violet radiation and potential vitamin D producing capacity through meteorological factors. Cloud, mist or fog confined solely to early morning or late evening would have a much less serious effect on vitamin D production than the same conditions in the middle of the day, so that simply to multiply the anticipated amount of vitamin production, as calculated from Fig. 7, by the daily percentage of sunshine, as recorded in meteorological tables, is to ignore the manner of distribution of antirachitic radiation during a given day. Tables showing at least the hourly distribution of sunlight throughout the day are needed. Except for a limited number of observatories in Britain such data are not available, so that the results recorded at Kew in the years since 1881 must serve to provide a basis of estimation to be applied, with reservations, to other parts of the country.

The Kew records reveal that, during the summer months, each of the hours from 8 a.m. to 4 p.m. enjoys about half an hour of recordable sunshine. This suggests that the effects of clouds may reasonably be regarded as being evenly distributed throughout the day in the British Isles. For the purposes of calculation the figure of 40 per cent. of the possible full amount of sunshine may be taken for the " summer " months, April to September inclusive, and 30 per cent. for the rest of the year. Since the distribution of one half hour of sunshine over each of the middle hours of the day might, because of the midday " peak " in the activity/time curve (Fig. 7), lead to the loss of *more* than half of the hour's activity, these estimates of losses are conservative ones. When the adjustment has been made, the yearly totals of potential vitamin D production for latitudes 50° and 60° N. are reduced to approximately 220 and 130 I.U. of vitamin D per sq. cm. of surface normal to the incident beam, respectively.

Even these reductions in the amounts of possible vitamin D are not all. Sunlight of very varying intensities is sufficient to produce scorch marks on the recording cards. At Kew, during the last few years only, thermopiles (Gorczynski, 1924) have been used to give continuous records of the amount of direct radiation from the sun. Since glass screens intervene between the thermopile and the sun, little or none of the ultra-violet radiation can be recorded, but data such as those in Table III show that one hour of sunshine can have very different energy values. In some cases, therefore, one hour of such sunshine cannot possibly be contributing its full amount of ultra-violet radiation ; it may, indeed, provide very little.

To some extent these variations in the quality of sunlight have been accounted for in the logarithmic opacities of Fabry and Buisson (*op. cit.*), which include the factor of 0·25 for " haze " independently of change of wavelength, the assump-

Table III

Hour commencing		5	6	7	8	9	10	11	12
May 28th, 1947	Sun (hour)	1	1	1	1	1	1	1	1
	Energy	28	47	60	68	71	74	75	77
August 18th, 1947	Sun (hour)	1	1	1	1	1	1	1	1
	Energy	35	46	54	56	16	35	40	61

tion of such constancy being supported by the more recent biological observations of Kay and Barrett (1947). Fabry's results were obtained in an industrial town, a fact which lends support to their application to British conditions—an application which need not be made too timidly, however, seeing that a completely dust- and "haze"-free atmosphere would increase the calculated antirachitic potencies of sunlight only by about 75 per cent. Many observers have noted the very marked loss of ultra-violet radiation in sunlight in the neighbourhood of large towns (*e.g.*, Coblentz, 1931), while Laurens and Mayerson (*op. cit.*), Frawley (1931) and Clements and Golding (1936), among others, have stressed the adverse effects of humid atmospheres on the transmission of ultra-violet radiation, so that sunlight in industrial, humid Britain and Ireland may well be less potent than the experiments of Fabry and Buisson suggest.

In the absence of actual experiments, however, there is one possible compensating factor to be put against any attempt to lower much farther the estimated values for the potency of short-wave solar radiation in the British Isles. Most strongly on normally cloudless days, but poorly when there is much mist, cloud or smoke, ultra-violet radiation which has been scattered from its direct path from the sun reaches ground level from other parts of the sky. In good conditions it would seem that this "skyshine" may have about one-half of the *energy* value of the direct sunlight (Laurens & Mayerson, *op. cit.*) but, in the absence of precise information of its composition, it is difficult to assess its biological value: it will probably consist of the somewhat longer waves of comparatively low physiological potency.

Variations in the important ozone layer in the earth's upper atmosphere also occur, but the observations of Fabry and Buisson were made in a favourable year, so that any variations of the potency of sunlight due to alterations in the amount of atmospheric ozone are more likely to be decreases than increases.

[A list of references will be given at the end of the final paper.]

ELECTRIC STUNNING OF PIGS

A report on the conditions requisite for ensuring humaneness in the electric stunning of pigs, by Phyllis G. Croft, PH.D., M.R.C.V.S., of the Neuropsychiatric Research Centre, Whitchurch Hospital, Cardiff, is issued by UFAW, of which body she is a research fellow, from 284, Regent's Park Road, Finchley, London, N.3. Pending further reference to these investigations it may be stated that Dr. Croft finds that

(i) For humaneness it is essential that the shock should be adequate for producing an electroplectic fit (*i.e.*, an electrically-induced fit resembling an epileptic fit).

(ii) When the shock is adequate, unconsciousness lasts for about a minute, but for the ensuing half-minute or so the animal may be electricaily curarised, *i.e.*, sensitive to pain but unable to move or squeal: hence the importance of prompt sticking.

(iii) Inadequate shock causes the distressing condition known as "missed shock," *i.e.*, violent disturbance without a true fit and without loss of consciousness.

The conditions for adequacy of shock are given, while there is a section on practical instructions.

THE VETERINARY RECORD
March 15, 1952

THE CARE OF LABORATORY ANIMALS: AN UNJUSTIFIABLE RECOMMENDATION

IN 1876 the law relating to cruelty to animals was extended "to the cases of animals which for medical, physiological, or other scientific purposes are subjected when alive to experiments calculated to inflict pain." This is "The Cruelty to Animals Act, 1876," and there are restrictions concerning the individuals allowed to use animals for experimental purposes, the species of animal used, the places where such experiments are permitted and the nature of the experiments. All places so registered are to be visited by inspectors from time to time for the purpose of securing a compliance with the provisions of the Act. The Secretary of State is empowered to license any person whom he may think qualified to hold a licence to perform experiments under the Act and any application for a licence must be signed by two persons. These are specified and one must be the President of a Royal Society, a Royal College or similar institution and the other is "a professor of physiology, medicine, anatomy, medical jurisprudence, materia medica, or surgery in a university in Great Britain or Ireland, or in University College, London, or in a college in Great Britain or Ireland, incorporated by royal charter." The first list of approved persons includes "The President of the Royal College of Veterinary Surgeons, or the President of the Royal Veterinary College, London, but in the case only of an experiment to be performed under anaesthetics with a view to the advancement by new discovery of veterinary science."

It is customary for a prospective licensee to burden the President of the Royal Society, the President of one of the Royal Colleges or someone holding a similar high position, with a request for his signature. The second signature may be obtained more readily if there is close contact with a professor of one of the subjects enumerated, otherwise application must be made to someone who may know little or nothing of the applicant personally.

During the year 1951 a committee appointed by the Treasury "to consider and to advise on the future organisation, structure and remuneration of medical staffs employed in Government Departments" issued a report. Apart from the suggestions which indicate that medical men enjoy a greater comparative affluence than veterinary surgeons similarly employed there is, with one proviso, little need for comment. This exception concerns section 40 which, under the heading of "*Inspectors under the Cruelty to Animals Act, 1876* (*Home Office*)," reads as follows: "These Inspectors require a high standard of medical and scientific knowledge if they are to keep abreast of developments in research and to assess properly the ultimate value of experiments prepared under the Act. We recommend that the present practice of recruiting only doctors to these posts be continued." No mention is made of any necessity to have expert knowledge of the care of animals, and the committee of eight contained four with medical qualifications, and 14 of the 25 who gave oral evidence belong to the medical profession. It was not expected that members of our profession would have been called upon to advise the committee, but it would have been helpful to it to have had wider knowledge of the implications involved in the specific recommendation quoted.

The scientific advances made during the last 76 years should have been so evident and clear that similar advances should have been made in legislation which has some bearing on scientific achievement. Experimental animals are employed widely to-day for investigational and assay purposes ; they are necessary equipment for laboratories and disciplines far removed from the aspects of medicine implied in 1876. In those days pathologists, nutritionists, microbiologists, entomologists, helminthologists and biochemists were either unknown or unrecognised. Animal health and animal reproduction are of greater importance in the economy of the world to-day than many special medical problems and a great number of the advances in knowledge which have a direct bearing on human health are made by non-medical men. The assumption that all scientific knowledge which comes within the ambit of the Cruelty to Animals Act is vested in those trained in the medical art is unjustified. Science has tried and condemned the authority on which medieval medicine was based ; this Act is based on such authority and upheld by the recommendations made by the Howitt Committee in 1951.

The inspectors, who require a high standard of medical and scientific knowledge, must have omniscience if they are able to assess equally the ultimate value of experiments made in such diverse disciplines as pharmacology, biophysics and veterinary helminthology. There is the implication that the erudition of the inspectors is such as to enable them to appraise adequately the representations made for a licence to perform experiments after the application has been supported by the President of a Royal Society and a University professor ; this is presumptuous. No appreciation is shown by the committee of the fact that these inspectors are appointed because of a Cruelty to Animals Act. An essential part of the work of the inspector is taken up with the visits paid to registered premises and with the care, comfort and well-being of the animals kept on those premises. The medical man appointed is charged with this duty and the animals may include cats, dogs, cattle, sheep, pigs, horses, as well as rats, mice, guinea-pigs and monkeys. It is reasonable to suppose that selected veterinary surgeons would be more at home with such duties—a supposition with which most medical men and scientists would agree.

The Act of 1876 is outmoded ; the recommendation of 1951 is not justified. Scientific achievement has outstripped medical authority and amendments in this Act are desirable and necessary.

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case the operation was carried out as described and both testicles removed were perfectly normal in appearance.

On January 1st, 1952, I received a request to visit this colt, as the head lad considered that the animal had developed a second right testicle and he described the colt's behaviour as sexually precocious when out with the two-year-old fillies. On examination and palpation there appeared to be a testicle with a normal cord.

On January 7th, approximately four and a half months after the first operation, the animal was again operated on and with some difficulty the " testicle" was removed. The tunica vaginalis had become closely adherent to the scrotal mucous membrane and there was no visual sign of any epididymis.

The specimen was dispatched immediately to the Department of Pathology at the Royal (Dick) Veterinary College, and their report, dated January 10th, states that " macroscopic and histological examinations of frozen sections confirm that this is a normal functioning testicle."

CLINICAL COMMUNICATIONS

REMOVAL OF FOREIGN BODY FROM THE THORACIC PORTION OF THE OESOPHAGUS IN THE DOG

J. V. S. RUTTER, M.R.C.V.S.,
AND
J. HELME, M.R.C.V.S.,
HEREFORD

Subject.—Scottish Terrier bitch, aged nine years.

History and Examination.—The dog was brought to us because the owner was sure it had a bone " stuck in its stomach." Three days previously the owner had seen the dog swallow a piece of mutton bone that the butcher had thrown to it. Castor oil and liquid paraffin had been given, frequent emesis had occurred, and the dog was very miserable, refusing all food except liquids. Palpation of the stomach failed to reveal any foreign body, although a certain amount of pain was shown on pressure to the epigastric region. X-ray examination, following a small barium meal, revealed a bony obstruction in the thoracic portion of the oesophagus, about 1 inch from the stomach.

Operation.—Anaesthesia was induced by intravenous nembutal. Attempts to withdraw the bone through the oesophagus failed completely, as did an effort to push the bone on into the stomach with a steel probe. Abdominal surgery was then decided upon.

A median incision was made just behind the sternum and the stomach brought up to the orifice. A 2-inch incision was then made in the stomach wall and exploratory examination with the index finger was carried out. It was found that by forcing the finger up through the oesophageal opening of the stomach the bone could just be touched with the nail. A pair of fine blunt-ended forceps was guided along the finger up to the bone. Eventually, after repeated attempts, the bone was grasped and, using a considerable amount of traction, was drawn into the stomach and thus removed. The offending object was a jagged piece of mutton bone, measuring 25 by 16 mm. It was impossible to judge the amount of damage done to the oesophageal wall, but haemorrhage into the stomach was slight. The stomach wound was closed with fine catgut and the abdominal muscles and skin sutured in the usual way with nylon. Penicillin was used freely during the operation. Within 48 hours of the operation the bitch took liquids herself and from then on made an uninterrupted recovery. No solid food was given for a fortnight and a very strict diet was maintained for another month. At no time following the operation did there appear to be any pain or discomfort in swallowing.

* * * * *

POLYORCHIDISM

A. E. CAREY FOSTER, M.R.C.V.S.,
EPSOM AND KINGSWOOD, SURREY

On August 21st, 1951, a bay yearling thoroughbred colt was castrated by me in the presence of the trainer and his head lad. In this practice the open method is employed as the animals are invariably done standing and after incision of the scrotal skin and tunica vaginalis, a second incision is made in a posterior direction through the non-vascular portion of the cord above the epididymis, thus freeing it. Removal of the testicle is completed with an emasculator. In the above

(*Concluded at foot of previous column*)

ABSTRACTS

Bovine Trichomoniasis*

This is an interesting and authoritative paper from Zurich University where trichomoniasis has been studied for many years. It is now well known that

(1) trichomoniasis can be cured relatively easily in female cattle by genital tract irrigation with Lugol's iodine ;

(2) bulls are the transmitters and carriers of infection ;

(3) infection is carried mechanically in the external genitalia and no infection of deep tissues or organs occurs;

(4) bulls never throw off infection spontaneously.

Unless infected bulls can be freed from contamination with trichomonads they must be excluded from breeding. As no reliable curative method has been known hitherto, this prohibition has in the past caused grave financial loss to the owners of valuable bulls.

The author, at the Veterinary Bacteriological Institute of Zurich University, has worked to improve diagnostic technique and to develop a reliable curative method and seems to have succeeded in both.

Diagnosis.—Trichomonads for culture are obtained by preputial washings with sterile normal saline (pure NaCl). In order to improve the " catch," a few erections are first provoked by the exhibition of a cow. Deep seated trichomonads are thereby loosened from their seats and more easily washed out in the saline.

Trichomonad cultures are prepared in broth with 10 per cent. horse serum under liquid paraffin, after adding both penicillin (500 u. per c.c.) and streptomycin (200 to 400 μg. per c.c.) to eliminate bacteria.

This technique should give pure cultures with much increase in the trichomonads in one to seven days. Bacterially contaminated cultures have to be discarded.

Treatment.—This is based on the sensitivity of trichomonads to oxygen and the task is to expose all the parasites to it. Ordinary preputial irrigations with hydrogen peroxide are ineffective. They can be made effective by the following technique :—

(1) Cleansing irrigation with 400 to 500 c.c. Tinovetin NR (Geigy) 0·2 per cent. (a non-ionic detergent), lasting five minutes and including massage to aid penetration into all crevices.

(2) Regional anaesthesia by four injections each of 20 c.c. of 2 per cent. Procaine + adrenalin, subcutaneously into the wall of the sheath at regular distances. This causes relaxation of the musculature of the sheath so that all parts become soft and pliant within half an hour of the injections. The time is now ready for

(3) The irrigation treatment, consisting of (*a*) surface anaesthesia with 125 c.c. Pantocain 0·5 per cent. + 25 c.c. adrenalin (0·1 per cent.), acting for five minutes, then (*b*) the main curative irrigation with 1 litre of 30 per cent. hydrogen peroxide with 15 c.c. Tinovetin, in 6½ litres of distilled water, at 40° C. This is sprayed into the sheath at a pressure of 4½ atmospheres. The nozzle is slim and blunt ended and is pushed well into the hinder annular end of the preputial sac so that the fluid can run briskly over the mucous membrane of the collum glandis (the important lodgment site for trichomonads). The irrigation tube is fitted with a soft rubber overtube which makes a sufficiently tight fit at the preputial orifice to dam back the irrigation fluid somewhat, so as to distend the sheath and obliterate all crevices. The spray jet is moved about (gently) all the time in order to avoid mechanical damage to the mucous membrane.

During two years 100 bulls were treated in this way. All were positively diagnosed and all were freed from infection (six to seven follow-up cultural examinations, though one done 12 days after treatment was confirmed to be quite reliable). Six of the 100 bulls became reinfected after some months and five of them were successfully treated again, the sixth being replaced. Four additional bulls could not be cured : on investigation they were found to have erosions of the mucous membrane which required surgical and antiseptic treatment before re-treatment with H_2O_2 was finally successful against the trichomonads.

J. E.

* * * * *

Spermatogenesis in Rams*

The semen characteristics of 33 merino rams were studied over a period of about two years. A reduction in the total number and longevity of spermatozoa during the summer months occurred despite an adequate diet. Vitamin A deficiency, if severe, resulted in the appearance of abnormal sperm in the semen of rams maintained on either a high or a low plane of nutrition. The addition of pure carotene to the diet prevented or reduced this degree of abnormality.

A. T. C.

* * * * *

Mortality in Sheep and Goats in India†

This is an analysis of deaths among sheep and goats on certain Government farms in India. Particulars are given of these farms. The analysis was based on (*a*) information on 100 to 300 or more fatal cases occurring on each farm over a period usually of at least three years : these are styled " direct sample data ;" (*b*) data extracted from reports submitted annually to the Indian Council of Agricultural Research. The analysis emphasises how little exact information is hitherto available as to animal disease in India, apart from some well-defined conditions.

The total number of deaths in sheep analysed under (*a*) was 3,548, and in goats 540, and the data are tabulated. Deaths are dealt with under five broad groupings: (1) disorders of early life, (2) parasitic disorders, (3) lung affections, (4) old age, (5) miscellaneous cases, and they have been further considered according to age at death and the season of its occurrence. Within these groupings, allocations are somewhat arbitrary. For instance, group 1 includes deaths up to six months of age ; group 2 includes deaths ascribed to " debility," " diarrhoea," etc., if parasitic disease in the flock was known to be widespread ; group 3 excludes cases under six months of age ; group 4 is confined to animals of six years or over, provided there was no easily apparent cause such as pneumonia ; group 5 includes sheep-pox, deaths from wild animal attack and so on.

Both direct sample data and data from the reports emphasised the high death-rate among younger animals. Thus, over a series of years nearly two-thirds of the mortality in sheep was in young stock, and in goats about three-quarters of it. Other figures showed that both in sheep and goats the mean annual mortality rate was two to four times higher in the young than in their dams. The bulk of the deaths occurred in the first three months, the death-rate in males being higher than in females.

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* **Diagnose und Therapie der Trichomonadenseuche beim Zuchstier.** [Diagnosis and Treatment of Trichomoniasis in Bulls.] Hess, E. (1951.) *Tierarztl. Umsch.* **6.** 191-196.

* **Seasonal Changes in Spermatogenesis in Rams : Their Relation to Plane of Nutrition and to Vitamin A Status.** Sapsford, C. S. (1951.) *Austr. J. agric. Res.* **2.** 331-341.

† **Mortality in Sheep and Goats in India.** Minett, F. C. (1950.) *Indian J. Vet. Sci.* **20.** (Part 2.) 69-103 ; 11 tables and other listed data.

There were suggestions that (*a*) mortality in weaned kids was higher than in unweaned, (*b*) mortality both in ewes and lambs was relatively higher when the ewes were allowed to lamb twice in the year.

At several of the sheep farms helminthic disease was an outstanding source of mortality, while the effect of environment, nutritional and climatic (both of special importance in India), in this connection is emphasised. The death-rate from helminthic disease, both in sheep and goats, seemed to be at its worst from six months to two years and especially at 6 to 12 months. In goats the majority of deaths occurred before the age of six months.

As to seasonal effect, the numbers of cases and the conditions on the farms were sometimes so different that no general statements could be made. Deaths in lambs and kids up to six months of age were usually more frequent in the colder weather, after making due allowance for the season of birth. Similarly, deaths in older sheep from helminthic disease and pneumonia were highest between October and March. Certain other diseased conditions having a definite seasonal incidence are mentioned.

Other information noted in passing is (*a*) that with kids male births were proportionately greater than female, (*b*) of nearly 2,000 goats kidding at two of the farms 55 per cent. gave twins.

REVIEW

[**Circus Doctor.** By J. Y. HENDERSON, D.V.M., as told by RICHARD TAPLINGER. (1952.) London: Peter Davies, Ltd., 38, Bedford Square, London, W.C.1.; pp. 224. Price 12s. 6d.]

When J. Y. Henderson accepted the invitation of John Ringling North, head of Ringling Brothers and Barnum and Bailey Circus, to become their veterinary surgeon, it meant the transfer from a mixed practice in Louisiana to a hectic time with bears, elephants and lions. A vista of a rich and colourful life was revealed, and with it the prospect of living in cramped quarters called staterooms. We are given an account of these experiences which entailed the care of the collection of 700 domestic and wild animals. In spite of the long jump from "a horse-and-cow practice to a tiger-and-elephant clinic," the veterinary surgeon avoids physical injury though he falls in love and marries "the girl on the flying trapeze."

This is an entertaining book and the accounts of the care and attention given to circus animals will be read with pleasure by animal lovers. Discipline and not cruelty is essential in the teaching of tricks; ill-treatment leads nowhere and the infinite care and patience of the trainers reveal the sound psychological insight possessed by the successful ones. Some tiny sound or smell or action might arouse the wild instinct in the circus animal and the good attendant and trainer is always alert. Although some of the stories told may have a little embroidery there are lessons to be learnt and not least is the appreciation of the general principles of animal health, animal management and disease. The application of these general principles enabled the author to become an effective and essential member of the circus; the training given to students of veterinary medicine and surgery should receive some of the credit accruing to J. Y. Henderson.

VICTORIA VETERINARY BENEVOLENT FUND

MEETING OF COUNCIL

A meeting of the Council of the Victoria Veterinary Benevolent Fund was held at No. 10, Red Lion Square, London, W.C.1, on Wednesday, January 9th, 1952, when the following members were present: Mr. E. P. Barrett, Professors T. G. Browne, J. B. Buxton, Major J. J. Dunlop, Mrs. Daisy I. Glover, Professors R. E. Glover, J. McCunn, W. M. Mitchell, Captains T. M. Mitchell, J. W. Procter, Professor G. H. Wooldridge and Major W. H. Wortley. Mr. C. W. Francis, Secretary, was in attendance.

Chairman.—In the absence of the President, Professor J. B. Buxton, Vice-President, took the chair.

Officers.—The Secretary reported that both the President (Lieut.-Colonel P. J. Simpson) and the Hon. Secretary (Mr. Arnold Spicer) were absent through illness, whereupon the Secretary was instructed to convey to them the Council's sincere regrets at their indisposition and best wishes for their speedy recovery.

Minutes.—The minutes of the previous meeting held on September 27th, 1951, having been printed and circulated, were taken as read and signed as correct.

Apologies for Absence.—The Secretary announced apologies for absence from the following: Messrs. John Holroyd, P. E. Mullaney, Professor L. P. Pugh, Mr. H. W. Steele-Bodger, Captains W. Watt, A. Whicher, Mrs. E. B. Wooldridge and Mrs. M. E. Wright (President of the Ladies' Guild).

Correspondence.—(i) A letter from Mrs. D. I. Glover, Hon. Treasurer of the Ladies' Guild, enclosing cheques for £300 for the General Fund and £500 for the Christmas Gift Account, the latter to be added to the £101 8s. sent earlier in the year, and asking that the total of £601 8s. be divided between the Christmas and summer allocations as was done in the previous year.

The reply of the Secretary suitably acknowledging these handsome gifts was also read.

(ii) A letter from Mrs. B. W. Hill-Owens conveying the names and addresses of officers of the Ladies' Guild appointed for the year 1951–52.

Investments.—The Secretary reported that the Treasurer had authorised the following transactions during the quarter:—

(*a*) The investment of the balance in the Donations Account amounting to £217 in the purchase of £218 12s. 4 per cent. Funding Loan.

(*b*) The acceptance of an offer of conversion to 3 per cent. Defence Bonds (Conversion Issue) in respect of £250 3 per cent. Defence Bonds (Post Office Issue) which is due for redemption in March, 1952.

The action of the Treasurer was approved.

Accountant's Report. (See col. 1, p. 161.)

Life Members.—It was unanimously resolved—"That Messrs. H. C. Driver and W. Nairn be elected Life Members of the Fund." (Ref. Accountant's Report).

Christmas Gift Account.—The Secretary reported that in response to the appeal in *The Veterinary Record* the sum of £28 11s. 6d. was received.

In addition, the handsome amount of £601 8s., as reported earlier, had been received from the Ladies' Guild, which in accordance with the Guild members' wishes was to be distributed in the same manner as in the previous year, namely, half at Christmas, 1951, and the balance in June next.

The Executive Committee, after carefully considering the circumstances of all the Fund's recipients, allocated £290 as Christmas gifts, which was distributed in grants ranging from £20 to £5 to 35 recipients on December 14th.

Many letters expressing heartfelt thanks were received and these were handed round to the members.

In addition to monetary gifts the Secretary reported that two members had offered honey and a parcel of food and these were dispatched to three recipients nominated by the President.

Accountant's Report

The following report of the Accountant was read and approved, a vote of thanks being accorded to the respective donors :—

Since the previous meeting of Council the following special subscriptions and donations have been received :—

Subscriptions

	£ s. d.	£ s. d.
V.V.B.F. Ladies' Guild		300 0 0
"Anonymous"		5 0 0
"Anonymous"		0 10 6
		£305 10 6

Donations : *Collecting Boxes*

Ayrshire Division	3 5 11	
Central Veterinary Society	6 18 4	
Chambers, Franklin & Chambers	1 10 0	
Dumfries & Galloway Division	4 5 0	
Eastern Counties Division	10 12 2	
East Midland Division	2 17 6	
H. Gillmor	1 1 0	
G. N. Gould	3 10 6	
J. R. Hewer	2 0 0	
C. G. Hopson	3 3 0	
Lancashire Veterinary Association	3 4 0	
Lincolnshire & District V.M.A.	5 19 7	
J. J. Low	1 8 10	
C. Masson	0 10 0	
Mid-West Veterinary Medical Association	10 17 6	
J. T. Morton	1 6 3	
North of England V.M.A.	2 6 6	
North of Scotland V.M.A.	3 16 4	
North Wales Division	6 7 0	
G. S. Powley	0 12 6	
Pugh and Bruford	0 9 6	
Royal Counties V.M.A.	6 0 0	
Scottish Metropolitan Division	2 15 0	
Society of Women Veterinary Surgeons ...	3 3 5	
South Eastern Counties Veterinary Assn. ...	5 6 9	
Southern Counties Veterinary Society ...	1 18 4	
Steele-Bodger & Brancker	2 8 0	
Sussex Veterinary Society	2 4 9	
J. A. Pasfield	1 1 0	
Western Counties Veterinary Association ...	11 7 6	
J. B. White	2 2 0	
A. Whicher	1 14 3	
W. H. Wortley	0 12 6	
		116 14 11
Association of Veterinary Teachers and Research Workers	10 0 0	
A. Booth (per A. Whicher)	1 1 0	
W. H. Carr	1 1 0	
H. C. Driver (Life Membership)	10 10 0	
J. R. Hudson	5 5 0	
Mrs. Lily James	1 1 0	
Lancashire Veterinary Association	5 5 0	
W. Nairn (Life Membership)	10 10 0	
Mrs. Mary Shave (in memory of Dr. E. S. Shave)	1 1 0	
W. Hogarth Scott (*per* A. Spicer)	4 12 6	
West of England Ladies' Kennel Association	5 5 0	
		55 11 6
		£172 6 5

Cases

(i) *Old Cases*

No. 239. Widow, aged 77, living with married daughter, aged 37, who has two children. Income £2 5s. per week and £11 0s. 8d. half-yearly, both from Trusts. Applicant recently discharged from hospital after an accident. Now a cripple. Assistance previously given in this case discontinued in 1943 ; now re-applying for financial help.

The Executive Committee, having carefully considered this case in the light of her present circumstances, recommended a grant of 30s. per week, which was agreed to.

No. 241. Widow, aged 58. Three sons, 27 (married), 25, 21, and a daughter, 23. The Secretary reported that this case was put on the Agenda in view of the applicant's changed circumstances. It was resolved—"That the present grant of 30s. per week be continued for a further six months when the case be again considered."

No. 253. Daughter of late member, aged 53. The Council, after hearing a report that owing to defective eyesight and having to undergo treatment for sciatica she was no longer able to undertake work to augment her income which, after paying rent, etc., left her with approximately £30 per annum for food and clothing, thereupon decided that a grant of £2 3s. 4d. per month be made in this case.

No. 264. Daughter of late member, aged 63. The Secretary reported the receipt of a letter dated December 9th from this applicant stating that she had now obtained employment with a small riding school in London but that the salary was very small as all her food was provided. It was agreed to continue the present grant for a further 12 months, after which the case be again reviewed.

No. 279. Widow, aged 39. Four children, girls 18 and 16, boys 13 and 4½. The Executive Committee reported that since the last meeting of Council a reply to her request for a compassionate pension had been received from the War Office which was to the effect that a pension had been awarded. The amount was £174 per annum but will be subject to reconsideration from time to time. In view of the contents of her letter of November 8th, 1951, the Executive Committee decided that her grant of £3 per week should be continued to the end of 1951. The action taken by the Executive Committee was confirmed.

(ii) *New Cases*

No. 280. Widow, aged 61. One married son, aged 39. In receipt of War Office pension granted in 1917. The Executive Committee stated that having considered her application of November 27th, 1951, for temporary assistance they had made a special allocation of £20 from the Christmas Fund Account. The action of the Executive Committee was approved but after hearing a report from a member of the Ladies' Guild following her visit to this applicant, it was decided that no weekly grant be given in this case.

No. 281. Widow, aged 49. Two sons, 18 and 11, both at school. Unable to work owing to illness. Only income, widow's pension. The Secretary reported that this case was presented on her behalf by the Veterinary Medical Association of Ireland. It was resolved—"That a grant of £2 be made to this applicant but that the case be further considered in 12 months' time."

Date of Next Meeting.—It was agreed that the date of the next meeting be left in the hands of the officers but if possible it be fixed during the R.C.V.S. April quarterly meetings.

The meeting then terminated with a hearty vote of thanks to Professor J. B. Buxton for his conduct in the chair.

XVth International Veterinary Congress, 1953

PRELIMINARY PROGRAMME FOR STOCKHOLM

In its first official bulletin, the Organising Committee of the XVth International Veterinary Congress, to take place in Stockholm in 1953, states that it has been decided to hold the Congress from Sunday, August 9th to Saturday, August 15th, inclusive.

According to the preliminary programme suggested by the Organising Committee, the scientific part of the Congress will comprise:—

1. *Plenary meetings* dealing with subjects included in the following branches of veterinary science, these sessions being held in the mornings: Infectious Diseases, Mastitis in Cattle, Metabolic Disturbances, Food Hygiene, and Comparative Pathology.

2. *Sectional meetings*, as follows, these sessions being held in the afternoons:—

Section I. *Infectious Diseases.*—Bacterial infection and intoxication (including spirochaetosis, rickettsiosis, and mycosis). Virus diseases and bacteriophages. Vaccination, serum therapy, and problems of immunity.

Section II. *Diseases Caused by Animal Parasites.*—Protozoal diseases. Diseases caused by helminths. Diseases caused by arthropods.

Section III. *Poisoning.*—Poisoning from industrial works. Plant poisoning. Poisoning especially from DDT preparations, other pest control agents and certain rat killers, etc.

Section IV. *Metabolic Disturbances, Deficiency Diseases, and Allergies.*—Metabolic physiology. Metabolic disturbances and deficiency diseases. Allergic diseases.

Section V. *The Physiology and Pathology of Reproduction and of Lactation.*—Physiology and the technique of artificial insemination. Fertility disturbances in male and female animals. Udder diseases including diagnosis and control.

Section VI. *Animal Husbandry.*—Hygiene, feeding, and care. Genetics and breeding. Artificial insemination (breeding and organisation).

Section VII. *Diagnosis, Therapy, and Surgery.*—Diagnosis (roentgenography, electrocardiography, etc.). Chemotherapy. Antibiotics. Anaesthesia and narcosis. Surgery.

Section VIII. *Food Hygiene.*—Meat hygiene. Milk hygiene. Control of fish, shell-fish and tinned goods. Methods of storing and tinning. Food poisoning.

Section IX. *International Veterinary Co-ordination Problems.*—International standardisation of serodiagnostic methods and of bacteriological preparations (sera, vaccines, and allergens). Transport and quarantine regulations. International transmission of semen. International co-operation for producing veterinary educational films.

The announcement, which is signed by Axel Alegren (Chairman) and Axel Isaksson (Secretary), proceeds: "The definite scientific programme will be published as soon as it has been confirmed, in accordance with the Statutes of the Congresses, by the Permanent Commission for International Veterinary Congresses together with the Organising Committee. Simultaneously, invitations to read papers before the sections will be sent out. Particulars concerning the names of the plenary lecturers appointed by the Organising Committee and the titles of their papers will be given as soon as possible, and also a communication concerning the Congress fee.

"Invitations to membership of the Congress will be distributed in August, 1952. The address of the Organising Committee is: XVth International Veterinary Congress, Organising Committee, c/o Isaksson, State Veterinary Medical Institute, Stockholm 50, Sweden."

Weekly Wisdom

Time has a way of dealing unkindly with early reports on new remedies.—"The Lancet."

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The Royal Windsor Horse Show, which was to have been held in May but was postponed because of Court mourning, will be held on July 24th, 25th and 26th, in the Home Park, Windsor.

IN PARLIAMENT

Sale and Distribution of New Cars

In the House of Commons on March 3rd, in reply to Miss Elaine Burton, who raised the above matter on the adjournment, the Parliamentary Secretary to the Ministry of Supply (Mr. A. R. W. Low) said: I am sure we are all aware that the problem of the distribution of cars is caused mainly by the limitation, at the request of the Government, of the number of new cars which can be sold in the home market. To a certain extent the motor car manufacturers are facing difficulties which they are increasing for themselves by their success in the export market, and by their success in adhering to the home quota set by the Government. I agree with the hon. Lady that that is no excuse for standing still and doing nothing. I do not think that over these years the motor trade has stood still and done nothing.

If the hon. Lady will examine some of the points she made, she will see how, progressively, since 1946 the motor traders have tried to make their distributive system fairer and more effective. She spoke of certain people having had many post-war cars. There was first a covenant of six months which was extended to one year, and then at the end of 1950 to two years. In addition, the motor manufacturers made it a rule that, except in exceptional cases, no new car should be sold to anyone who has had a post-war car. Many of the examp'es the hon. Lady gave to the House were clearly examples of people who had acquired their second or third post-war car before the end of 1950. To that extent she took no account of the great improvement and tightening up of the system of distribution which took place as a result of the consultations of the former Government with the motor trade at the end of 1950. . . . I have to tell the House that we have been in consultation with the trade with the object of closing the loopholes in the system, and as a result I am able to tell the House of some improvements. Each customer, whether a private individual, a company, a business or a fleet user, will be required to declare his actual transport and need before a new car is sold to him. This declaration will be made part of the agreement with the B.M.T.A. and, if it is false, it will lead to action if necessary.

The second improvement relates to the rules operating between the manufacturers and the sellers of the cars. The retailer must see that the declaration is taken in addition to the covenant, and no new car shall be provided to anyone who has had a new post-war car un'ess exceptional circumstances justify it. I have had talks with them about the exceptional circumstances and I understand that, in the main, exceptional circumstances would mean either that the customer's post-war car had done such a high mileage that it had become beyond economic repair or had become a total loss in an accident. In any case the customer would have to have an exceptional need for a new car.

Stricter conditions will be applied to the supply of cars to fleet users, firms and businesses, and new cars will go only to such people to rep'ace pre-war vehicles or to rep'ace post-war vehicles which are beyond reasonable economic repair or to add to the fleet if essential need is proved. It is obviously important to see that one person cannot have one new car for himself and one for his business. I have asked the industry to ensure that this loophole is blocked.

There will also be a change in the conditions governing delivery. De'ivery will be made in rotation according to the date of order, but certain exceptional cases will be taken out of order. These are, firstly, doctors, midwives and veterinary surgeons, who will be given their present degree of preference. Secondly, those who have special business or professional use for a car—but there will be a very strict assessment of these needs—and thirdly, compassionate cases where, on grounds of re'iability of transport, a preference ought to be given. Consideration is being given to the advisability of asking the retailer to pub'ish his list or show it to any person included on the list, but that is a matter I must leave to the trade.

I now have a word to say about the system of allocation by the manufacturer to the retailer. It is not clear how far the present system of allocation met the difficulties of the dealers and traders who have orders for cars produced by manufacturers with whom they have no contract. An investigation is therefore being made into orders placed in 1946. Their system of allocation will take into account those orders and seek even distribution to all traders, whether they have contracts or not.

I hope, for these reasons, that the hon. Lady will accept our decision not to have the enquiry she proposed at this stage. I hope she will see from what I have said how this difficult problem is being tackled, and also that, if there is to be a benefit from the alteration of rules, because of the very sma'l number of cars reaching the home market—60 000 this year—few people will benefit from it. Both the Ministry and the industry are anxious to see that distribution is as fair as it possibly can be.

Cockfighting Bill

The Cockfighting Bill, the text of which was published last week, seeks to make illegal the possession of domestic fowl or appliances for use in cockfighting. It is presented by Mr. Sidney Marshall, Conservative member for Sutton and Cheam, with the support of eight other Conservative members. The penalty imposed for an offence under the Bill is a maximum fine of £25 or three months' imprisonment, or both.

[Support for the Cockfighting Bill, a private member's Bill, is being given by the R.S.P.C.A. An official of the Society stated recently that there was evidence that cockfighting was still carried on in this country. It was not an extensive practice, but mains were held, and held in such secrecy that it was difficult to obtain evidence that would lead to prosecution and conviction. The last conviction was in 1938. The new Bill would make it easier to stamp out this cruel sport, because preparation of the bird, or possession of a "prepared" bird or of the steel spurs fixed to its legs, would be illegal.

Mr. Sidney Marshall stated that his Bill was substantially the same as the amended Bill which failed to become law in 1949 after it had been passed through the House of Commons and had had its second reading in the House of Lords. It was awaiting committee stage when the session ended. Cockfighting was made illegal in 1835.]

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Questions

Lambing (Hypodermic Needles)

Mr. Maitland (March 3rd) asked the Minister of Agriculture whether his attention has been drawn to a shortage in the supply of hypodermic needles for injecting lambs with lamb-dysentery serum and ewes with lamb-dysentery vaccine, as a result of shortage of materials; and whether, since this shortage may affect the success of the lambing season, he will take steps to ease the supply of the materials in question.

Mr. Nugent: I am not aware of any shortage either of suitable needles or of materials for their manufacture. If my hon. Friend will let me have particulars of any cases of difficulty that have come to his notice I will be glad to have enquiries made.

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Hard Pad Disease

Mr. E. Wakefield (March 3rd) asked the Minister of Agriculture what progress has been made in the research being carried out at the Veterinary Laboratory at Weybridge into hard pad disease among dogs.

Sir T. Dugdale: The work which has been carried out at the Veterinary Laboratory at Weybridge indicates that in certain respects there is a close relationship between the viruses associated with classical distemper in the dog, as known in this country, and so-called hard pad disease. The work on these diseases, which was carried out in the course of the general study of virus questions at Weybridge, has now been concluded and no further work specifically in connection with them is contemplated for the present.

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Foot-and-Mouth Disease

Mr. Fernyhough (March 6th) asked the Minister of Agriculture whether he will take steps to prohibit foxhounds being brought from a foot-and-mouth disease area into a non-infected one.

Sir T. Dugdale: I am advised that the bringing of foxhounds from an area infected with foot-and-mouth disease into free country does not involve any material risk of the spread of infection, and I should not therefore feel justified in prohibiting such movements. Hunting is prohibited inside an infected area.

Mr. Crouch (March 6th) asked the Minister of Agriculture if he will consider making compulsory the vaccination of all bulls at artificial insemination centres with polyvalent serum against foot-and-mouth disease.

Sir T. Dugdale: No. I am advised that vaccinated bulls might become infected and, while showing little or no sign of illness themselves, be capable of passing on infection. A vaccinated bull might, therefore, be the cause of widespread dissemination of the disease before it became suspected as a source of infection.

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Animal Shipments, Ireland

Brigadier Peto (March 6th) asked the Minister of Agriculture whether his attention has been drawn to a recent case where 140 donkeys were imported from Ireland to this country for re-export to the Continent for slaughter and which were found by his port veterinary inspector to be unfit to travel; and whether he will issue a new order to prevent the cruelty at present involved in this traffic.

Lieut.-Commander Hutchison asked the Minister of Agriculture whether he is yet in a position to make an order under the Diseases of Animals Act to regulate the import of horses and donkeys from the Republic of Ireland.

Mr. Rankin asked the Minister of Agriculture when he proposes to issue an order regulating the import of horses and equine animals into this country from Ireland.

Sir T. Dugdale: Only 18 of the 140 donkeys recently exported from Eire were presented to my veterinary inspector for examination and all were rejected as ineligible for shipment to the Continent, though not on the ground that they were unfit to travel. The donkeys had previously been examined by veterinary officers of the Government of Eire before shipment from Eire, and I am informed that every one was found to be fit to travel.

I hope to make in the near future an Order ensuring suitable conditions of travel for horses and donkeys brought into this country by sea. My powers in this respect are limited to the protection of animals from unnecessary suffering on the journey and I have no general power to regulate the importation of horses from Eire.

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Undulant and Q Fevers

Mr. Balfour (March 7th) asked the Minister of Health how many cases of undulant fever, caused through drinking milk, there have been in the British Isles since March, 1948; what were the numbers infected; and where they were located during 1951.

Mr. Crookshank: As this is not a statutorily notifiable disease I am afraid that the information requested is not available.

Mr. Balfour asked the Minister of Health if his experts have yet established the difference between undulant fever and what is known as Q fever, with special reference to the Withal test.

Mr. Crookshank: Yes, I am advised that laboratory methods which distinguish between these diseases are now available.

NOTES AND NEWS

Diary of Events

Mar. 19th.—Meeting of the Section of Comparative Medicine, Royal Society of Medicine, at 1, Wimpole Street, W.1, 5 p.m.

Mar. 20th.—Society of Women Veterinary Surgeons: Visit to The National Institute for Research in Dairying, Shinfield, Reading, 2.15 p.m.

Mar. 20th.—Meeting of the Herts and Beds Division, B.V.A., at Luton (The George Hotel), 7.30 p.m.

Mar. 20th.—Visit of the Society of Women Veterinary Surgeons to the National Institute for Research in Dairying, Shinfield, Reading.

Mar. 21st.—Annual General Meeting of the Biochemical Society, at the National Institute for Medical Research, Mill Hill, N.W.7, 10.30 a.m.

Mar. 25th.—Meeting of the Southern Counties Division, B.V.A., at Winchester (Royal Hotel), 6 p.m.

Mar. 26th.—Meeting of the North Wales Division, B.V.A., at Denbigh (Old Grammar School, Park Street), 2 p.m.

Mar. 26th.—Meeting of the Association of Veterinary Teachers and Research Workers (Northern Region) at the School of Agriculture, Sutton Bonington, Loughborough, Leics, 11 a.m.

Mar. 27th.—Annual General Meeting of the Western Counties Division, B.V.A., at Exeter (Imperial Hotel), 11.30 a.m. Annual Luncheon 1 p.m. Afternoon Session 2 p.m.

Mar. 27th.—Meeting of the South-Eastern Division, B.V.A., at Maidstone (Royal Star Hotel), 2.30 p.m.

Mar. 28th.—Yorkshire Division, B.V.A. Dinner-Dance at Leeds (Parkway Hotel).

April 29th, 30th, and May 1st.—Meetings of Council and Committees, B.V.A., in the Royal (Dick) School of Veterinary Studies, Edinburgh.

Sept. 8th—13th.—Seventieth Annual General Meeting and Congress of the British Veterinary Association, at Harrogate.

PERSONAL

Sir Thomas Dalling's Consultative Post with F.A.O.

When Sir Thomas Dalling, at the end of this month, retires from his post as Chief Veterinary Officer to the Ministry of Agriculture and Fisheries, he will take up an appointment in Rome as a veterinary consultant with the United Nations Food and Agriculture Organisation. This was indicated by the Minister of Agriculture, Sir Thomas Dugdale, when, at a celebration luncheon held in London on March 4th, he presented to Sir Thomas Dalling and Mr. James Mackintosh, jointly, the Thomas Baxter prize awards for 1951, for outstanding services to milk production. Further reference to these presentations will be made in an early issue.

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Births.—BEATTIE.—On March 5th, 1952, to Mr. and Mrs. George S. Beattie (Shona Douglas), 11, Fulwood Park, Liverpool, 17, a son.

SALISBURY.—On February 18th, 1952, at Luton, to Isobel (*née* Murray), wife of Norman Salisbury, B.SC., M.R.C.V.S., a son—David Murray.

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R.C.V.S. OBITUARY

HOLMANS, Stephen Edward, Westcombe, 66, Baddlesmere Road, Tankerton-on-Sea, Kent. Graduated London, January 3rd, 1881. Died March 3rd, 1952; aged 92 years.

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GENERAL OBITUARY

THE LATE DR. A. L. McNABB

[CONTRIBUTED]

As recorded in your issue of February 23rd, Dr. Andrew Leslie McNabb, Principal of the Ontario Veterinary College for the past seven years and one of the leading veterinarians in North America, died at the General Hospital, Guelph, Ontario, on Saturday morning, February 16th, after being in poor health for over a year. He was in his 57th year.

Born at Beachburg, Ontario, he received his early education at Powassan and Kenmore. He graduated from a business college at Ottawa. He was a graduate of the Ontario Veterinary College in 1923 and the following year successfully passed the examinations of the Michigan State Board. Dr. McNabb obtained his doctorate of veterinary science from the University of Toronto in 1945.

In October, 1924, Dr. McNabb was appointed bacteriologist of the Ontario Department of Health, and in September, 1928, director of the division of laboratories, Ontario Department of Health, including the central laboratory in Toronto with 136 members and eventually branch laboratories in Sault Ste. Marie, Ottawa, North Bay, Kingston, Fort William and subsidised laboratories in Timmins, St. Catharines, Peterborough, Kingston, London and Belleville. In 1945 he was appointed Principal of the Ontario Veterinary College, a position he held until his death.

Dr. McNabb enlisted in April, 1916, and from October of that year until May, 1919, served in France as a stretcher bearer with the 11th Field Ambulance. He was a casualty at Passchendaele. Following the armistice and before returning home he served with No. 1 Forestry Corps headquarters staff.

During the Second World War he was requested by the Dominion Government to investigate a disease outbreak in Labrador and he established a bacteriological laboratory there. In 1944, Dr. McNabb was named laboratory consultant of the Canadian Army in Canada with the rank of Lieut.-Colonel.

Dr. McNabb was a Fellow of the Toronto Academy of Medicine and of the American Public Health Association, a member of the American Society of Immunologists, the Ontario Veterinary Association, and of the Executive Board, District 1, American Veterinary Medical Association. He was college representative on the Board of Directors of the Canadian Veterinary Medical Association and a member of the laboratory section and the laboratory council, Canadian Public Health Association. Dr. McNabb was also a charter member of the American Board of Veterinary Public Health. In 1948 he was chosen veterinarian of the year by the Ontario Veterinary Association. In 1949 he was made an honorary associate of the Royal College of Veterinary Surgeons in Great Britain. He was a member of the session of Chalmers United Church in Guelph and was a Mason.

He leaves his wife, the former Florence Clarke; one daughter, Margaret Jean; two sisters, Mrs. C. M. Scott, Peterborough, and Mrs. W. B. Faith, of Ottawa.

More than 800 friends of Dr. McNabb, including faculty personnel, Government officials, representatives of Canadian and American universities and fellow veterinarians, joined relatives in mourning the passing of this outstanding veterinarian at the service held on February 19th in the War Memorial Hall on the college campus. Rev. D. G. Paton, of Chalmers United Church, Guelph, assisted by College Padre W. A. Young, conducted the service and took as the theme of his address the words of St. Paul: "After he had served his generation by the will of God he fell asleep and was laid unto his fathers." The presiding Minister drew attention to Dr. McNabb's outstanding achievements in the academic world, his rôle in the development and expansion of the Ontario Veterinary College, in scientific research, in the field of public health, and in many veterinary activities. Praising Dr. McNabb's service to his generation first on the battlefield in World War I and later in the scientific laboratories of Canada, the Reverend Paton said: "He threw himself with complete abandon into the struggle against all things that menace health and well-being. He led a victorious, forward-looking life."

Interment was at Woodlawn Cemetery in Guelph, with the Reverend Paton and Padre Young officiating. The pall-bearers were Dr. T. Lloyd Jones, acting Principal of the Ontario Veterinary College; Dr. A. F. Bain, Head of the Department of Preventive Medicine and Hygiene, Ontario Veterinary College; E. I. McLoughry, Associate Director of Extension, Ontario Department of Agriculture; Dr. Gordon Anderson, Calgary; Dr. James Bell, Ontario Department of Health, Toronto; and Dr. Wallace B. McClure, Ontario Department of Health, Toronto.

Among the numerous dignitaries who were present to pay their final respects were:—

President Sidney Smith and J. C. Evans (Registrar), University of Toronto; Dean G. M. Clark, School of Veterinary Medicine, Michigan State College; Dr. J. G. Hardenbergh, Executive Secretary, American Veterinary Medical Association; Dr. John Orr, Acting Dean, Queen's University; Hon. W. E. Hamilton, M.P.P., South Wellington; H. H. Hosking, M.P. for South Wellington (representing Queen's University).

C. D. Graham, Deputy Minister of Agriculture, Toronto; Colonel G. H. Basher, Deputy Minister of Reform Institutions, Toronto; Dr. R. Gwatkin, Animal Diseases Research Institute, Hull, Quebec; Dr. W. R. Reek, former President of the Ontario Agricultural College; Dr. J. D. MacLachlan, President of the Ontario Agricultural College; Professor R. A. Runnells, Michigan State College; Dr. P. L. Rouse, Erie, Pa.; Dr. J. A. Campbell, Toronto; Dr. J. T. Phair,

Deputy Minister of Health, Toronto; Hon. F. S. Thomas, Minister of Public Works for Ontario; Dr. A. Savage, Animal Pathologist, University of Manitoba, and Dr. A. P. Morris, Toronto (representing Health of Animals Division, Federal Department of Agriculture).

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Sir Charles Sherrington, O.M.

We regret to record the death, at the age of 94, of Sir Charles Scott Sherrington, O.M., M.D., F.R.S., the great physiologist, who during his lifetime had become accepted as one of the foremost figures in the history of the biological sciences and more particularly in the development of our knowledge of the brain and spinal cord.

Sherrington, who was born in 1857, received his schooling at Ipswich before proceeding to Cambridge, where he came under the influence of the Cambridge school of physiologists inspired by Michael Foster. He graduated in medicine at St. Thomas's Hospital, and studied pathology under Virchow and bacteriology under Koch for a short time before returning to physiology. In 1895 he became Holt Professor of Physiology at Liverpool, a post he held until his appointment in 1913 as Waynflete Professor of Physiology at Oxford. He retired in 1936. He was elected a Fellow of the Royal Society in 1893, was appointed O.M. in 1924 and was chosen jointly with Professor E. D. Adrian for the Nobel Prize in Medicine in 1932.

His great contribution to our knowledge of the nervous system was contained in his Silliman Lectures at Yale University in 1904 and published under the title of *The Integrative Action of the Nervous System*. In these lectures Sherrington showed the manner in which the brain and spinal cord ordered so beautifully the movements of head and limb. He provided an orderly and unified theory based on experimental facts, largely the result of his own fruitful investigations, which formed a solid basis for the integration of the mass of unrelated data which had been accumulating in neurophysiology and clinical neurology during the last decades of the nineteenth century. In particular he provided a firm experimental basis for the work of the English clinical neurologists, Hughlings Jackson and Gowers.

Much of Sherrington's work was carried out on the dog. His early studies followed those of Ferrier, to whom his *Integrative Action* is dedicated, and Goltz on the effect of ablations of the dog's cerebrum, while his later descriptions on experimental lesions of the spinal cord of the dog are of the greatest value in our understanding of naturally-occurring spinal cord syndromes. The spasticity of the forelegs seen in cases of traumatic injury of the posterior thoracic and lumbar spinal cord, and known as the Schiff-Sherrington phenomenon, is named after him and was observed in his experimental animals. His later studies in collaboration with Creed, Denny-Brown, Eccles and Liddell were published in 1932 under the title of *Reflex Activity of the Spinal Cord*.

Sherrington's interests were not confined to physiology. While in Liverpool he took an active part in the formation of the Liverpool School of Veterinary Medicine and was an examiner for the diploma of membership of the R.C.V.S. He worked on rabies at the Brown Institute, of which he was Professor-superintendent from 1892 to 1895, and was a member of the Malaria and Sleeping Sickness Commission of the Royal Society. In 1924 he served on the Government Committee on Foot-and-Mouth Disease.

This brief account of Sherrington's life and work gives but small indication of his intellectual insight and clear perception of the complexities of the biological organism. He was able, as few men have been able, to cast problems in a form permitting a measurable scientific answer. These faculties were founded, as he said, on an early classical education and a deep knowledge of natural philosophy. He was both poet and philosopher. In 1925 he published *The Assaying of Brabantius and other verse*. In the years of his retirement he considered the wider field of man himself, and in his Gifford Lectures delivered at Edinburgh and published in 1940 as *Man on his Nature*, he showed the wide humane philosophy, which emerged from his contemplation of man's mental activities.

Sherrington was one of the most gentle and courteous of men. His passing removes one of the last of the intellectual giants, who made the years about the turn of the century one of the golden ages of physiology and neurological medicine.

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LEGAL NOTES

Further Successful R.C.V.S. Prosecutions for Illegal Practice

During the month of February the Royal College brought the following successful prosecutions for contravention of the Veterinary Surgeons Act, 1948, in addition to those already recorded in our columns.

At Ipswich, Sidney Cooke, of Hamilton Road, Ipswich, summoned for practising veterinary surgery, being an unregistered person, admitted two offences, and was fined £2, with £2 15s. 8d. costs. Cooke pleaded not guilty to two other similar alleged offences and no evidence was offered on these by the prosecution.

Prosecuting, Mr. Allan Gotelee explained that the Veterinary Surgeons Act, 1948, was designed to protect animals and to prevent unauthorised treatment and care by persons who did not fall into one of two classes—a qualified veterinary surgeon or a person who was on the Supplementary Veterinary Register.

Cooke, a man of completely good character, did apply for registration and his application was supported by a large number of people. But, added Mr. Gotelee, the Royal College took the view that he did not come within the Act, largely owing to the fact that he had not practised veterinary surgery as his principal source of livelihood for 10 years. He was sent in June, 1951, a letter in which was set out exactly what he was allowed to do and what he was not allowed to do. He was not permitted to carry out veterinary surgery, which meant the diagnosis and treatment of disease and the performance of operations other than as set out in the schedule.

It was alleged that on one occasion he diagnosed kidney trouble and prescribed tablets and powders, and in the other case said he thought a dog had bronchitis and prescribed cough mixture and powders.

Mr. W. J. Block, defending, said his client was not "just a quack." He had had almost 60 years' experience of animals and considerable knowledge of their treatment. When he retired from work as an A.A. scout he was approached by the Ipswich Animal Welfare Centre and spent three or four years with them. In addition, on numerous occasions he acted as helper to veterinary surgeons.

The breach of the Act had arisen entirely through a misunderstanding, continued Mr. Block. When Cooke was told the provisions of the Act, he instructed solicitors to try to get him placed on the Supplementary Register, but owing to the fact that this was not his principal source of livelihood for 10 years prior to the passing of the Act his application was refused. Mr. Block said that when his client gave tablets he thought he was relieving pain, which was one of the things he was entitled to do.

Imposing the fine, the Chairman (Mr. S. J. Stearn) told Cooke: "The fine to which you are liable is a very heavy one, but we are inclined to deal with your case as leniently as we reasonably can. We know that you are an honourable man."

At the conclusion of the case, Mr. Block said his client now felt that he must give up his work among animals.

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A case at Mansfield against a Mansfield Woodhouse man who practised as a veterinary surgeon was said by the prosecuting solicitor, Mr. G. A. Dawson, to be "breaking new ground in this court." William Arthur Holmes, of 14, Butt Lane, Mansfield Woodhouse, was charged with practising veterinary surgery while not registered in the Register of Veterinary Surgeons, and taking the title of veterinary surgeon, not being registered. He was found guilty on both charges and was fined £1 in each case, with £7 13s. costs.

Mr. Dawson said the Veterinary Surgeons Act of 1948 prohibited unqualified people from practising, not for the protection of professional veterinary surgeons, but for the protection of animals.

The case arose out of an incident on Christmas Day, when Holmes inserted a number of stitches in the legs of a dog owned by Mr. John Thompson, of 6, Mapletoft Avenue, Mansfield Woodhouse, said Mr. Dawson. The next day, the stitches began to fall out and the animal's legs were swollen. The dog was eventually taken to the Mansfield R.S.P.C.A. clinic. Inspector Hodgson said he went to see Holmes who admitted that he had treated the dog which had severe cuts on its legs.

When told by the Inspector that he would be reported, Holmes replied: "What's the matter? Have I taken one your customers?"

To the court, Holmes said he had never described himself as a veterinary surgeon.

The Chairman said the magistrates hoped the case would be a warning to others.

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For unlawfully practising as a veterinary surgeon and falsely describing himself as such, Robert Grout, of First Cross Road, Twickenham, an 80-year-old pensioner who said he had been looking after cats and dogs for 30 years, was fined £10 and 10 guineas costs at Brentford.

It was stated that Grout had a board outside his house which read "Canine and Feline Clinic." When a small girl brought a cat to him, Grout said it was suffering from poisoning and gave it some powder.

Later the cat was examined by a qualified veterinary surgeon who found it had been given the wrong treatment. The cat had to be destroyed.

Frank Palmer, of Mandeville Road, Isleworth, was fined £40 and 10 guineas costs at Brentford for practising as a veterinary surgeon while unregistered and using a false description at his place of business. He pleaded guilty to two summonses taken out by the Royal College of Veterinary Surgeons.

Mr. M. Aherne, for the R.C.V.S., said the College regretted having to bring the proceedings, but Palmer's conduct left them no alternative. When Palmer was previously before the Court on another matter, he described himself as a veterinary practitioner and his place of business as an animal clinic. He was written to by the College, but took no notice of the warning.

After a second warning, Palmer applied to be admitted to membership of the R.C.V.S., but his application was refused as he did not fulfil the necessary conditions.

In spite of this he still continued to display a notice, "Animal Clinic," outside his premises.

It was hardly necessary to point out that much suffering might be caused to sick animals if they were treated by unqualified persons.

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P.D.S.A. Paris Branch Officer Fined

Action Brought by French National Organisation of Veterinary Surgeons

The Paris correspondent of *The Daily Telegraph*, in a message published by his paper on February 28th, states that on the previous day Mr. Reginald Horne, British Administrative Director of the Paris Branch of the People's Dispensary for Sick Animals, was fined £5 for illegally practising as a veterinary surgeon.

"The action was brought by the French National Organisation of Veterinary Surgeons, to whom Mr. Horne was ordered to pay £6.

"It was stated that animals were given free treatment at the organisation's clinic but that there was a box there for voluntary subscriptions."

The *Telegraph* proceeds to quote an official of the headquarters of the P.D.S.A. in London as commenting "We are always most particular about observing the rules of the various countries where we operate.

"The regulations may be slightly different from the ones in Britain where our staff do not have to be qualified veterinary surgeons but may work under licence. Mr. Horne was probably fined on a technical point. There is no question of closing down our Paris dispensary because of this incident."

As recorded in our issue of January 27th, 1951, Mr. Reginald Horne was one of four P.D.S.A. employees whose appeals to the High Court against the refusal of Council, R.C.V.S., to admit them to the Supplementary Veterinary Register were dismissed. In Mr. Horne's case application for registration was made on the grounds that he had been practising as required by the Act in Great Britain and in France. The Act required that a total of seven years' practice must be in the United Kingdom and as the total of his period of practice in Great Britain was only five and two-thirds years, and the remainder of the time between that period and the seven years was practised in France, he was refused registration.

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CAREERS IN AGRICULTURAL RESEARCH

A.R.C. Fellowships and Training Grants, 1952

Particulars of fellowships and training grants awarded by the Agricultural Research Council for the current year are given in an A.R.C. publication, "Careers in Agricultural Research."

After specifying the openings available in agricultural research and advisory work, it is announced that in 1952 the Council is again offering a limited number of Junior Agricultural Research Fellowships. These are intended to provide opportunities for research workers of outstanding ability to continue their investigations and widen their experience in subjects related to agriculture. The standard required for the award will be high and any Fellow will be regarded as a potentially outstanding worker. In recognition of this a Fellow seeking a post with the Council or one of the grant aided institutes at the end of the period of the award will, if accepted, enter the service with the grade of Senior Scientific Officer. The Fellowships will be tenable either in a University Department or any other agreed institution at home or abroad for a period of three years and will carry a stipend of £600 per annum.

The brochure proceeds: "In veterinary research there is a growing need for workers with a dual qualification, *i.e.*, in basic science, and in veterinary medicine. The Council, recognising that this training is long and expensive, have established Veterinary Training Grants which will enable science graduates to follow a full four years veterinary course after taking their science degree. An essential requirement is that candidates for these awards should be able to claim exemption from the First Professional Examination of the Royal College of Veterinary Surgeons."

Awards, which are tax free and of values between £200 and £300 per annum, are generally made in the spring or early summer of each year, to commence on October 1st, but exceptional cases will be considered at any time and awards made to commence immediately.

Application must be on the prescribed form which, with full particulars of these grants, may be obtained from The Secretary, Agricultural Research Council, Cunard Building, 15, Regent Street, London, S.W.1. Closing date for applications is March 21st, 1952.

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SCIENTIFIC EFFORT IN THE COMMONWEALTH

The eminent Australian veterinarian, Dr. Ian Clunies Ross, Chairman of the Commonwealth Scientific and Industrial Research Organisation, was Chairman of the Conference of British Commonwealth scientists which has concluded its sittings in Melbourne. *The Times* quotes Dr. Clunies Ross as saying that the principal purpose of the conference had been to discuss means of integrating scientific effort throughout the Commonwealth. The conference regarded the watch on development in five fields as especially important. They were industrial microbiology, research into the use of low-grade ores, use of solar energy, infertility of sheep and cattle, and agricultural engineering. One of the conference's most important achievements had been to show that there were no scientific frontiers between one part of the Commonwealth and another. Speakers had emphasised that as fast as increased scientific knowledge improved the world's supply of food, better medical and hygiene services had produced a larger number of mouths to feed, and concern was expressed over the possibility that the world's population eventually would overtake the food supply.

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FOOT-AND-MOUTH DISEASE IN CANADA

In our last issue we reported the first outbreak of foot-and-mouth disease in Canada for many years, that at Saskatchewan. In a message to farmers, Mr. J. Gardiner, Minister of Agriculture, advised against panic selling of stock, as compensation would be paid for animals destroyed and the Government was investigating outlets alternative to the United States, where an embargo has been imposed on imports of Canadian livestock and animal products. The Canadian Federation of Agriculture, in its annual memorandum, which was presented to the Federal Government on March 6th, described the outbreak as a "national calamity." It asked the Government to take exceptional measures to meet what it called the discouraging market situation caused by the outbreak.

All stock going from this country to the United States must go through quarantine in Canada, and shipments of stock destined for the United States must stay in Canada until the outbreak subsides. The animals will stay in their quarantine for 30 days, and then be moved for further quarantine elsewhere in Canada.

It is pertinent to recall the following references to the disease made as recently as March 1st in our notice of the report of the Veterinary Director-General, Canada, 1950-51: "As in this country, foot-and-mouth disease heads the list, in spite of the fact that Canada has been free from this scourge for some years, but the increase of trade with Central and South America, where the disease is endemic, and the rapidity of modern transport, are a constant source of concern to those responsible for maintaining the country free from disease." The report also revealed that (says our comment) "the profession in Canada faces many of the problems well known to us in this country, particularly that of man-power in the Federal and Provincial Services. It is interesting to note the peculiar difficulty which has arisen in these services owing to loss of men of some standing during the last few years, leaving few persons suitable to fill the more responsible posts, many of which are now held by men near or over retiring age."

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NEED FOR RESTRICTION OF HERD BOOK ACCEPTANCES

Speaking in London last week at a conference of breeders organised by the Farm and Estate Bureau, Dr. John Hammond, F.R.S., advocated restriction of registrations in herd books to cattle that achieved satisfactory records. He said that something worth while would be achieved if cows were entered only after tests in three or four lactations, and bulls were registered only after they had been progeny-tested. There was too great a tendency at present to register any animal without question, simply because it was of pedigree stock. The herd books were established to prevent deterioration in good and improved stock. Nowadays they recorded everything—good, bad, and indifferent—and that was why much trouble had arisen. What were needed were *élite* sections in which every animal had the top standards of a breed.

ANTIBACTERIAL AGENTS IN COW'S MILK

In an annotation on the antibacterial effect of cow's milk, *The Lancet*, in its issue of February 16th, says that such antibacterial action was discovered in 1894, but at first little work was done on it. "The antibacterial substance, which Jones[1] called 'lactenin,' was found to have a bacteriostatic rather than a bactericidal action; only the most sensitive of the test organisms, *Streptococcus pyogenes*, was actually killed, and then only when present in small numbers. *Streptococcus agalactiae*, the organism causing bovine mastitis, was inhibited for a few hours, after which it multiplied rapidly. Jones found lactenin in the whey, where it could be concentrated by dialysis since it did not pass through semi-permeable membranes. An alcohol-precipitated active fraction was obtained from this concentrate, but was not chemically pure. No better method of concentration has yet been described.

"Lactenin may be present in the milk when it is absent from the blood,[1 2] and presumably it is synthesised in the mammary gland. It withstands heating to 60° C. for 20 minutes and is thus unlikely to be a serologically active compound. Similarly it is not an antibody. Human milk is rich in lysozyme, which may possibly account for most of its antibacterial activity; but lactenin is unlikely to be identical with lysozyme since only very little of the latter is found in cow's milk.[3] Jones thought that lactenin played a part in resistance of the mammary gland to infection, and Foley and Lee[4] tried to explain the sudden appearance of bovine mastitis in terms of the development of lactenin-resistant strains. Jones and others also suggested that lactenin helps to prevent milk-borne epidemics due to *Strep. pyogenes*. More recently, however, McEwen and White[5] have confirmed that lactenin occurs to about the same extent in udders with and without infection. Moreover, when they produced an artificial mastitis by infusing cultures of *Strep. agalactiae* the lactenin titre of the milk was not altered, and thus doubt was thrown on the hypothesis that lactenin accounts for the resistance of the udder to infection. The recent work of Wilson and Rosenblum[6] is therefore of special interest. These workers show that lactenin acts only in an aerobic medium, and that anaerobic conditions and the presence of reducing agents like cysteine and glutathione abolish its inhibitory action. Catalase has no 'anti-lactenin' effect. They have further shown that milk removed from the udder by catheter is in a reduced condition, because it quickly decolorises methylene-blue. Wilson and Rosenblum suggest that in the udder lactenin is inactive.

"Nevertheless the rôle of lactenin or other antibacterial substances in the mammary gland cannot be lightly dismissed. For instance, Neave *et al.*[7] have shown that the cow is more susceptible to infection in the dry period than during lactation, and work now proceeding at the National Institute for Research in Dairying has revealed that in the dry period the antibacterial power of the secretion is low, the normal inhibitory activity returning in the colostrum on about the second day *post partum*. There is good evidence, too, that the inhibitory properties of early colostrum and of milk are due to different substances. Finally it is known that the rate of growth of the milk streptococcus—*Strep. lactis*—is subject to seasonal variations. This organism is not susceptible to the inhibitory substances in milk,[8] and variations in the concentration of growth-stimulating substances might explain the seasonal changes. From an epidemiological viewpoint these growth-stimulating substances may be more important than the inhibitory substances."

(1) Jones, F. S. (1928.) *J. exp. Med.* **47**. 877.
(2) Chambers, W. H. (1930.) *J. Bact.* **5**. 527.
(3) Thompson, R. (1940.) *Arch. Path.* **30**. 1096.
(4) Foley, E. J., Lee, S. W. (1948.) *Cornell Vet.* **38**. 367.
(5) McEwen, A. D., White, M. B. (1950.) *Vet. Rec.* **62**. 26.
(6) Wilson, A. T., Rosenblum, H. (1952.) *J. exp. Med.* **95**. 39.
(7) Neave, F. K., Dodd, F. H., Henriques, E. (1950.) *J. Dairy Res.* **17**. 37.
(8) Morris, C. S., Edwards, M. A. (1949.) *Ibid.* **16**. 161.

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MEAT PRODUCTION IN BRITAIN

Addressing a meeting of the Farmers' Club on March 3rd, Mr. M. Passmore said it was of little use to improve grazing areas unless there were rewards for efforts made. The grazier's reward was the price he obtained for his fat beasts. Money spent on improvements might be wasted unless there were facilities for killing and storing the animals he fattened. The meat-producing countries—particularly New Zealand—had made provision to match production. In this country attempts were being made to fit production to facilities. The time to kill cattle for meat was when they were as fat as it was economically possible to get them. Unless provision for killing and storing was made, any increase in output from the grazing areas would mean lower returns through reductions in prices to avoid gluts.

Much grazing land in the Midlands was probably more productive than expanses devoted to cash crops in the eastern counties, but the climates of the two areas were different and there were variations in soil textures. He favoured ploughing for corn—which was far more profitable than meat—only if conditions were suitable. The best and cheapest way of providing meat was by sheep, and he believed that British farmers could achieve a return an acre equal to the average in New Zealand. It was possible that in areas of higher rainfall better use could be made of land as a source of grass for feeding sheep rather than of barley to feed pigs.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax:
Angus.—Seafield Farm, Arbroath (Mar. 1st).
Cheshire.—Alvaston Farm, Alvaston, Nantwich (Mar. 6th).
Fife.—Cattle Court, Bruckley Farm, Guardbridge (Mar. 4th).
Lanarks.—Langside Farm, Kirkfieldbank, Lanark (Mar. 5th).
Lancs.—Park House Farm, Bay Horse, Lancaster; Head O' Th' Marsh Farm, Brindle, Chorley (Mar. 1st).
Leics.—Mount Pleasant Farm, Six Hills, Seagrave, Loughborough (Mar. 1st).
Norfolk.—Alma Lodge Farm, Great Fransham, Dereham (Mar. 4th).
Northants.—Barnwell Mill Farm, Barnwell, Peterborough (Mar. 1st).
Worcs.—Ryall House, Upton-on-Severn (Mar. 6th).
Yorks.—Well Holme Farm, New Farnley (Mar. 1st).

Foot-and-Mouth Disease:
Kent.—Iden Grange, Staplehurst, Tonbridge (Mar. 8th).

Fowl Pest:
Herefordshire.—Wormhill, Eaton Bishop, Hereford (Mar. 4th).
Yorks (W.R.).—Manor Farm, Throapham, Rotherham (Mar. 1st).

Swine Fever:
Bucks.—Deethe Close Allotments, Cranfield Road, Woburn Sands (Mar. 8th).
Derbys.—Mansfield Road Piggeries, Derby (Mar. 7th).
Essex.—Braemar, Mill Hill Drive, Billericay (Mar. 4th); "California," King Edward Road, Laindon (Mar. 6th); The Laurels, Hall Lane, Little Warley (Mar. 6th); Salmonds Farm, Ingrave (Mar. 8th).
Kent.—Marden Cottage, Priestwood Green, Harvel, Gravesend (Mar. 6th).
Lancs.—Oldfield Carr Farm, Poulton le Fylde; Green Lane End Farm, Leigh (Mar. 3rd); Bridgend Farm, Meadow Lane, Croston, Preston (Mar. 6th); Hacking Boat Farm, Hurst Green, Arghton, nr. Blackburn (Mar. 7th).
Leics.—Church Farm, Thurlaston Lane, Earl Shilton (Mar. 8th).
Staffs.—Priory Farm, Walton, Stone (Mar. 7th).
Warwicks.—Hercules Farm, Claverdon (Mar. 4th); Windmill Farm, Birmingham Road, Allesley, Coventry; Manor Farm, Knightcote, Kineton (Mar. 7th).
Worcs.—The Hill Farm, Broom Hill, Belbroughton (Mar. 3rd).
Yorks (W.R.).—Bleak House Farm, Cullingworth, Bradford (Mar. 7th).

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Canicola Fever

Reviewing the above subject in its issue of December 22nd, 1951, *The Lancet* observes: "Broom[1] has lately commented on the apparent rise in the incidence of *Leptospira canicola* infection in man. The disease in man was first described in 1934,[2] and in 1948 Minkenhof[3] found records of only 98 cases. In contrast to this, between 70 and 80 confirmed cases have occurred in England and Wales during the past four years[4]; and similar increases have been noted in other countries—notably Germany.[5-14] Most workers agree that the true incidence has probably not increased, and that the rise in the number of cases reported is due partly to great improvement in diagnostic facilities and partly to more widespread appreciation of the variability of the signs and symptoms; for example, the presence of canicola fever in man has lately been established in Cuba.[15] Puerto Rico,[16] Brazil,[17] Scotland,[18] Indonesia,[19] and Malaya.[20] Even now, however, a certain number of cases are discovered almost by chance,[1] so no useful estimate of the true incidence can be made; but it seems unlikely to be as high as three per 100,000 of population per annum, which is the figure suggested by Steigner and Messerschmidt.[13]

"It is, of course, well known that *L. canicola* is primarily a parasite of dogs, and that after clinical recovery from the illness the animals continue for a time to excrete leptospires in the urine. The carrier state is generally believed to persist for rather less than a year, but Broom[1] refers to unpublished work by G. L. Montgomery

and W. I.-M. McIntyre who demonstrated leptospires in the kidneys of dogs four and a half years after apparent cure of the disease. This observation is of special importance in view of the efficacy of penicillin in the acute stages of canicola fever in dogs,[21] because it was later found[22] that penicillin does not prevent the colonisation of the renal tubules and the development of the carrier state. Complete eradication can, however, be achieved even in chronic infections by administering streptomycin.[22] It seems probable, though no records have yet been published, that the same treatment would be effective in healthy carriers. It is impossible even to conjecture what proportion of dogs may be healthy carriers, since the condition is not likely to be suspected unless the animal transmits the infection to man. In all likelihood, however, the rate is high, because serological surveys have proved that 25 to 40 per cent. of dogs become infected at some time in their life.

"In man the disease is most often contracted by direct contact with infective dog's urine. Infection can also be acquired by bathing in contaminated fresh-water pools; Primavesi[14] has described eight cases in children who had bathed in a muddy pond along with two dogs; the serum of both animals contained agglutinins for *L. canicola*, but no further proof that they were carriers is adduced. Such evidence is not always easily obtained; for example, Broom[1] states that *L. canicola* was isolated from a suspect dog by injecting a suspension of its kidneys into hamsters, after repeated microscopical examination and inoculation of its urine had failed to reveal the organism.

"Because of the mode of transmission sporadic cases are the rule; and multiple cases, even in one household, are rare except when the nursing of a sick dog has been shared by two or more members of a family.[1 12 13 23] Epidemics of 39 and 28 cases have, however, been investigated in Germany. In one of these epidemics[13] contact with dogs was proved in every case, and the serum of all the surviving animals contained agglutinins for *L. canicola*. In the other epidemic[10] the first, explosive outbreak occurred among pea-harvesters, who were not accompanied by their dogs to the fields. Glattkowski[10] therefore suggests that some unidentified rodent may have been the carrier host. Certainly the epidemiology of canicola fever is not fully known, because cases undoubtedly occur in which most searching enquiries fail to reveal any obvious source of infection from dogs. At present it is advisable to include canicola fever, and, of course, the non-icteric form of true Weil's disease, in the differential diagnosis of all cases of 'pyrexia of unknown origin' especially if the symptoms include meningitis, nephritis, muscle tenderness, or injection of the conjunctivae, and the history suggests any possible contact with the dejecta of dogs or rats.

"Normally the disease is self-limiting—only two fatalities have been recorded—and treatment is mainly symptomatic; but in view of the predilection of leptospires for the kidneys particular attention should be paid to the renal condition. It is difficult to assess the value of antibiotics in the treatment of the benign forms of leptospirosis; penicillin does not produce a dramatic improvement in man, as it does in dogs, and reports on the newer antibiotics are too few to allow of any conclusions. To prevent transmission of infection from sick dogs to man, the owners should be warned of the risk and instructed how to disinfect the animals' dejecta. Fresh-water bathing-pools should be protected against both rats and dogs; chlorination is effective against leptospires as against other micro-organisms. When a case arises in man every effort should be made to trace the source of infection so that further spread can be averted."

(1) Broom, J. C. (1951.) *Mon. Bull Min. H'th. P.H.L.S.* **10.** 258.
(2) Dhont, C. M., Klarenbeek, A., Schuffner, W. A. P., Voet, I. (1934.) *Ned. Tijdschr. Geneesk.* **78.** 5197.
(3) Minkenhof, J. E. (1948.) *Lancet.* ii, 8.
(4) Broom, J. C. *Brit. med. J.* Sept. 22nd, 1951, p. 680.
(5) Günther-Kühne, H., Rimpau, W., Schubert, H. (1949.) *Disch. med. Wschr.* **74.** 129.
(6) Kindler, M., Schindler, R. (1949.) *Zbl. Bakt.* **154.** 286.
(7) Kramer, R., Wieland, O. (1949.) *Arztl. Forsch.* **3.** 460.
(8) Wegener, F. (1949.) *Disch. med. Wschr.* **74.** 1227.
(9) Stahl, E., Tetzner, E. (1950.) *Ib'd.* **75.** 254.
(10) Glattkowski, G. (1950.) *Ibid.* 857.
(11) Adam, W. (1951.) *Städtehyg.* **1.** 214.
(12) Heliwich, K. (1950.) *D'sch. GesundhWes.* **5.** 1140.
(13) Steigner, K. Fr., Messerschmidt, T. (1950.) *Z. ImmunForsch.* **108.** 37.
(14) Primavesi, K. A. (1951.) *Offentl. GesundhDienst.* **13.** 231.
(15) Curbelo, A., Marquez, V. (1949.) *Rev. cubana pediat.* **21.** 290.
(16) Boyer, C. I., Dammin, J. J., Reyes, F. M. (1948.) *Puerto Rico J. publ. H'th.* **24.** 177.
(17) Correa, M. O. A., Meira, J. A. (1949.) *Rev. med. cir. S. Paulo.* **9.** 185.
(18) Joe, A., Sangster, G. (1951.) *Edinb. med. J.* **58.** 140.
(19) Wolff, J. W., Loman, S., Wielenga-Bergman, A. B. (1951.) *Docums. neerl. indones. Morb. trop.* **3.** 187.
(20) Broom, J. C. Unpublished correspondence.
(21) Joshua, J. O., Freak, M. J. (1947.) *Vet. Rec.* **59.** 505.
(22) Brunner, K. T., Meyer, K. F. (1949.) *Proc. Soc. exp. Biol., N.Y.* **70.** 450.
(23) Campbell, A. M. G., Macrae, J., Manderson, W. G., Sumner, K. C., Broom, J. C. (1949.) *Brit. med. J.* i, 836.

SUPPORT FOR QUEENSLAND FARMING PROJECT

Veterinary Scientist Urges Use of Pilot Schemes

In a message to his paper dated February 21st, the Brisbane Correspondent of *The Times* says that support for the continuance of the Queensland British Food Corporation's scheme in central Queensland has come from the Professor of Veterinary Science at Queensland University, Professor T. K. Ewer, "at a time when the future of the project is in the balance."

"Professor Ewer has pointed out that the former link with the British Overseas Food Corporation has injected a controversial note into any discussion of the scheme, and that the British taxpayer is apprehensive at the possibility of more of his money being 'on a losing horse.' Only one-tenth of the amount spent on the African scheme was involved in Queensland, however, and he believed the prospects of success to be very high. The plan was to plough the land, the rich black soil, and to use the brief summer rainfall to grow selected high-yielding varieties of certain semi-tropical grain or oil seed. After the harvest the stubble was used as a winter supplement for cattle, while the 'seconds' quality grain formed a main ingredient in pig feeding. Professor Ewer commented that although no profits had been made yet the project was still new and there were heavy expenditures at the outset. Given one or two more normal seasons there seemed to be every chance of a profit being made.

"Professor Ewer expressed disappointment at the lack of scientific work on the various properties, and said that if costly mistakes were to be avoided controlled pilot trials on the most suitable ways of breeding and feeding cattle should be undertaken."

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CORONARY DISEASE IN DOCTORS

The authors (Dr. J. N. Morris, Mr. J. A. Heady, and Mr. R. G. Barley) have made the startling observation that the incidence of coronary disease in 1947-50 among general practitioners was almost twice as high as the figure for all the rest of the profession—a finding which bears out in a remarkable way the statement in the Spens report about the arduousness of the general practitioner's life.—*British Medical Journal.*

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

OEDEMA DISEASE OF SWINE

Sir,—As a general practitioner in a thickly populated pig area, where swine oedema has taken a heavy toll in the last two to three years, I have made a few observations and deductions on this disease, which I am venturing to put before your readers for their comments.

There are three factors common to every case of swine oedema with which I have dealt:—

1. Affected pigs have all been fed on a very "wet" ration—that is, all food has been given in the form either of a thin gruel, or a very unwholesome insipid swill, largely made up of water. Pigs fed dry, with water in a separate container, or with very stiff mashes, are, I find, never affected. It is reasonable to assume, then, that with thin gruels a pig must consume much more water than is necessary for its requirements to obtain a sufficient amount of food. A generalised state of oedema thus results. All our other domestic animals are fed—when fed properly, that is—with their water supplied separately. Should pigs be treated differently?

2. This condition occurs to a very large extent in the "back-yard" pig only. The explanation for this is, I feel, that the man who keeps, at most, two or three pigs, cannot, with present-day pig-food rationing, obtain enough good meal to feed them, so, by some quirk in his reasoning, he adds a large amount of water, to give it the appearance of having more bulk. Often I ask a pig-owner if he could possibly feed his pigs a drier ration, to which he invariably replies that he is not allowed enough meal in the ration to do this.

This could account, in part, at any rate, for the high post-war incidence of this disease. Farmers and large pig-breeders, who are usually better supplied with feeding-stuffs, are, I find, not troubled with this disease. It has always been taught, and it has been my experience, that an abnormally low protein diet will bring on dropsical and oedematous conditions, not, as is generally thought of swine oedema at the moment, a diet too rich in protein.

3. It is uncommon to find that a single pig in a sty will succumb to this condition. Contrary to popular "lay" belief, a pig can be quite a clean, careful and reasonably well-mannered eater.

if he is on his own. He is then able, if need be, to select from his ration what he feels he requires, so that if his owner serves up too wet a ration, he will take the meal he wants and leave the water. When he has companions, he is transformed at meal-times into a pushing, snapping, unpleasant creature gulping and bolting his food and water in a few hectic minutes in order to have his fill, having little regard for his needs.

I do not pretend that this abnormal water intake is the root cause of the condition, but I do feel that it is definitely a contributory factor, simple though it is.

Treatment of this disease has not been very encouraging for me. Although it looks essentially an allergic condition, I have had poor results with antihistaminics. Antibiotics, such as penicillin and sulphamethazine, have been tried, but I have found them of little use. I have always been hesitant to embark upon antibiotic treatment in this disease, as it seems on the face of it totally irrational, the clinical pictures and *post-mortem* findings being not in the least suggestive of a bacteraemia or a toxaemia. Those pigs which I have cured have had the disease whilst still in its opening stages. These were treated by starvation from food and water for 24 to 48 hours, during which time some form of heating was introduced into the sty and stimulants such as camphor-in-oil given. A strong solution of magnesium sulphate was prescribed and then the animal put on to dry bran or fourths for a day or two before bringing back the meal, also given dry. It was not until about the fifth or sixth day that water was offered. Recently, I have combined this treatment with the parenteral administration of vitamin B_{12}, as advised by Mr. Swift in recent correspondence, and I find it to be effective in the mild cases, at least. During the last stages of the disease, when the pig is in convulsions, nothing I have found is of any avail.—Yours faithfully, William A. B. Barr, 8, Monks Road, Lincoln. *March 2nd*, 1952.

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PARTIAL DILATATION OF THE *OS UTERI* IN THE EWE

Sir,—With reference to the article *re* so-called "ringwomb" or partial dilatation of the *os uteri* in the ewe in *The Veterinary Record* of July 7th, 1951, No. 27, we have had some experience of this condition and have found that large doses of stilboestrol dipropionate injected intramuscularly have proved useful.

We have given 40 mg., repeating this dose in 24 hours if necessary, and provided the amnion has not ruptured before treatment commenced the ewes have lambed live lambs. In other cases dead lambs have been delivered with or without help and the ewes have survived, except in cases where the ewes were already suffering from marked toxaemia when presented for treatment.

The cases treated have been of all ages even at the time of first parturition.

As these ewes have responded to hormonal treatment, and the condition has been seen at first parturition it would appear that the cause is not always due to trauma at a previous lambing.—Yours faithfully, T. B. Yarrow and G. Williams, 110, Corve Street, Ludlow, Salop. *March 3rd*, 1952.

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VOLVULUS IN THE COW

Sir,—My colleagues may be interested to hear of an unusual case of volvulus in the cow.

The subject was a four-year-old Friesian cow first seen by me in the morning. She was badly blown and in distress. Having passed the trocar, when a lot of gas escaped, I drenched her with a purge and left her considerably relieved. The owner rang up in the afternoon stating that the cow filled up again as soon as he left her for a few minutes and that she was in pain. I had left the cannula in position and advised him to massage the rumen periodically in order to force out any gas which might re-form. When I arrived, I found her lying on the ground, grunting, groaning, and badly blown on the right side, the left, however, being deflated. I attempted to pass a stomach tube, but was unsuccessful because of an obstruction in the oesophagus. An emergency rumenotomy was advised but after preliminary preparation, the cow died.

On *post-mortem* examination the omasum and abomasum were greatly extended with gas and were twisted. There was acute congestion in the area.—Yours faithfully, M. Sachs, c/o Messrs. Pugh & McCormac, 206, Stow Hill, Newport, Mon. *March 3rd*, 1952.

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SODIUM PROPIONATE IN VETERINARY THERAPEUTICS

Sir,—In your March 1st number, Mr. Ogilvie was discussing sodium propionate in veterinary therapeutics. In the treatment of the dermatophytoses he suggested that the penetrative power of the medicament determines its therapeutic usefulness. In my experience it is the vehicle that is perhaps even more important. For example, in my hands undecylinic acid is a potent fungicide, but the constitution of the vehicle can, I find, make or mar its therapeutic value. Properly prepared, I have found it, albeit expensive, without equal in the treatment of fungoid skin diseases. Whilst I am not prepared to argue the causation of "heel bug," the preparation also clears that condition very rapidly.—Yours faithfully, V. Berwyn Jones, 8, Peter Street, Manchester. *February 29th*, 1952.

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EPIZOOTIC CEREBRO-SPINAL NEMATODIASIS (OR SETARIASIS): SO-CALLED LUMBAR PARALYSIS

A Focal Encephalomyelomalacia of Animals in the Orient

Sir,—It is necessary to challenge the conclusions of D. L. Bush on the nature of lumbar paralysis (*J. Amer. vet. med. Assoc.* (1951.) **118.** 388), for if left unopposed, they might influence decisions regarding future research on the disease and methods for control.

Chronological developments in the discovery of the nature, pathogenesis and cause are all given in an article in the *British Veterinary Journal* by Innes, Shoho and Pillai (1952), in which tribute is accorded all relevant Japanese work, and which fills in gaps evident in Bush's paper—and it is just those filled-in-gaps which are so vital.

This disease of sheep, goats and horses has occurred in Korea, Japan and Ceylon for well over 30 years—perhaps in horses in India for over 100 years if, as we believe, the paraplegia of Kumri (India) is of the same nature. It has occurred as an annual enzootic or epizootic coinciding with the insect vector season. The cases examined by the Japanese now number many hundreds, and about 5 to 7 per cent. of sheep in some areas in Japan have been affected in some years. Indeed, if human Jap B. encephalitis deserves the adjective *epidemic*, then cerebro-spinal nematodiasis can be preceded by the word *epizootic*. Affected animals suffer from an acute, or subacute, paralysis which may be fatal; they may linger on longer and some may recover. In view of what we know about lumbar paralysis—an unfortunate designation—it is easy to understand how the disease escaped true recognition for so long. We refer to the occasionally microscopic nature of the nervous lesion, with the other complexity of identification of the causal nematode. The latter may wander out of nervous tissue and be found only by filtering the CSF, or be found in the formalin solution used to fix the brain and cord; further, the nematode may be recognisable only in acute cases of a few days' duration!

The specific nature, the severity of damage, and the location of the nervous lesion can brook of no argument that it is the basic change responsible for a varied, clinical, paralytic syndrome. The essential lesion is a focal encephalomyelomalacia proceeding to liquefaction and microcavitation (but cavitation may also be macroscopic), and it is consistent with what might be expected to follow traumatic wandering of a helminth in nervous tissue. This is supported by observations on experimental stab wound of the spinal cord of a sheep by a needle, and by comparing the changes with those in Wallerian degeneration in the cord and in compression myelopathy. The lesion of neural nematodiasis may be single or multiple, and may occur anywhere in the nervous system. As haemorrhage is inconstant, the lesion may be difficult to distinguish macroscopically. Hence, it might be necessary to embed the whole nervous system for section-cutting—indicating somewhat the arduous work perhaps necessary for correct diagnosis. There may be meningeal infiltrations containing eosinophils, which may extend to areas beyond the malacia, so in random selection of nervous tissues only a selective meningitis might be judged to be present. The lesion is unlike that in any viral, bacterial, protozoal, mycotic or toxic condition, nor is it a pure demyelination. There are thus many criteria for pathological diagnosis, but there are many pitfalls for the unwary.

Japanese workers proved that this neuroparalysis was caused by young worms of *Setaria digitata*, transmitted as larvae by mosquitoes—hence, the name epizootic cerebro-spinal nematodiasis. (As other filariae might produce a comparable disease, *nematodiasis* is preferable to *setariasis*.) The *natural host* of the nematode is cattle, in which the adults reside in peritoneum and mesentery. In *unnatural hosts*, the *Setaria* larvae migrate from the cutaneous inoculation and invade the nervous system, where they may cause devastating damage. Proof of cause was completed by studies of Japanese workers (Niimi, Kimura and 29 others), by observation of the nematodes in malacic lesions, and experimental production of the disease in the respective domestic animals. Innes (1951) and Innes, Shoho and Pillai (1952) showed that the caprine paralysis in Ceylon was a clinico-pathological replica of the Korean and Japanese disease, and McGaughey (1951) has now found the causal parasites in acute cases.

Dr. Bush, in his report, has unintentionally done a disservice to the merits of current veterinary pathology, and to the possible future of research on this disease. He dismisses some excellent work done by Japanese veterinarians as of little account, nor was he aware of studies on the Ceylonese disease. He claimed there

was no such nervous disorder caused by *Setaria digitata*, and that the lumbar paralysis was ostensibly osteomalacia and nutritional weakness. From his exposition, however, it is difficult to determine what was original work, and what were facts obtained by hearsay with Japanese workers. He may have been misinformed on previous studies, for he makes no mention of the main source of available information (*viz.*, the Special Korean Research Commission Report, 1939-42, published in five volumes), nor of many Japanese who were so notably concerned. Much of this misunderstanding might be blamed on language difficulties and perhaps incorrect interpretation; in fairness to Dr. Bush this must be stressed. His report is really an incnoate investigational survey. Further, it is of profound significance to note that there are *no records* of neuropathological examinations having been made, and it has been indicated how meticulous these might require to be. Leads in this direction were available in short Japanese papers (with German summaries) although these are not mentioned.

Surveys on animal diseases of this nature must always be incomplete unless established on sound pathological studies and if the latter had been made, a different story might have been forthcoming. The claims of Dr. Bush regarding the nature of lumbar paralysis must thus be regarded with scepticism, if not as, in effect, quite unproven.—Yours faithfully, J. R. M. Innes (San Antonio Texas), Chusaburo Shoho (Tokyo, Japan), C. Perumal Pillai (Royal Veterinary College, London), Foundation of Applied Research, San Antonio, Texas. *February 25th*, 1952.

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"HANDLING OF *BR. ABORTUS* VACCINE: AN OCCUPATIONAL RISK?"

Sir,—On page 889 of the December 29th, 1951, number of *The Veterinary Record* there is a note reproducing from the *British Medical Journal* a *Question* and *Answer* in connection with brucellosis.

I take exception to the statement in the *Answer* that "Desensitisation with an abortus vaccine could never produce chronic brucellosis. . . ." Just what is chronic brucellosis? According to the literature on the subject there are two manifestations which are referred to as chronic brucellosis. The first is an irregular recurrence of fever and malaise, often for months, after the initial infection. The second manifestation, which may or may not follow the typical undulant fever syndrome, is characterised by symptoms which are allergic in nature and may persist for years. In the first there is an active infection. In the latter the source of the brucella antigen or allergen is generally considered to be relatively inactive foci of infection, in spite of the fact that many individuals with this form of brucellosis are strongly immune as indicated by the opsonocytophagic test. The possibility of the source of the brucella allergen being extrinsic, *e.g.*, in milk products, appears to have been completely ignored by those studying human brucellosis.

In the second mentioned species of chronic brucellosis, *viz.*, brucella allergy, it is clear that the inoculation of dead abortus organisms may increase and perpetuate the hypersensitisation. This is particularly likely if the antigen is administered intracutaneously. In this site it may reside for years evincing repeated Arthus phenomena. A mild case of brucella allergy, perhaps asymptomatic, could possibly become symptomatic and highly sensitive by the careless employment of vaccine. If extreme discomfort is to be avoided, and complete desensitisation obtained, the services of a competent allergist should be enlisted.—Yours faithfully, G. R. Carter, Animal Diseases Research Institute, Hull, Quebec, Canada. *February 26th*, 1952.

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THE R.C.V.S. COUNCIL ELECTION

Sir,—I was somewhat surprised to receive this morning a communication from the Society of Practising Veterinary Surgeons marked "Circulated to all members of the Society."

Surprise was occasioned firstly because I resigned from the Society some considerable time ago; secondly because I consider the matter enclosed therein was somewhat distasteful, and thirdly by the fact that the voting paper which I received by the same post showed that there were no less than seven veterinary surgeons engaged in general practice amongst the nominees for election to the Council of the Royal College.

I am entirely in sympathy with the Society of Practising Veterinary Surgeons that it is vitally important for the profession that its practising members should take an active and leading part in the work of the Royal College, and other organised bodies within the profession. I object very strongly, however, to the principle of any group or body within the profession touting for support in the elections to Council of the Royal College, which is still a democratic institution with truly democratic elections, in which it is the privilege and duty of every member to vote just as he wishes, and not as "his union tells him."

Both the members for whom the Society of Practising Veterinary Surgeons is soliciting support are well known to me personally, and are gentlemen of whom I have the highest opinion. At the same time I do not know upon what basis they have been chosen from the seven equally well-known and well thought of practitioners who are standing for election. May I, therefore, appeal to all members to use their vote as duty clearly dictates it should be used, *i.e.*, in support of those candidates whom the voter honestly believes are best qualified to serve the interests of the profession as a whole.—Yours faithfully, L. Guy Anderson, 49, Cambridge Street, Aylesbury, Bucks. *February 23rd*, 1952.

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THE VETERINARY SURGEON'S TITLE

Sir,—Perusal of the correspondence columns in *The Veterinary Record* within recent weeks indicates that the question of the veterinary surgeon's title is again under discussion. The arguments put forward have prompted the penning of the following notes on the subject.

There can be no doubt that the term "doctor" (from the Latin "docere"—"to teach") has altered in meaning since archaic times when the title referred to "a person of great learning and qualified to instruct, literally a teacher." Dorland (1948) describes a doctor as (1) a practitioner of medicine, especially one who has received the degree of M.D. from a medical school; (2) a person who has received a diploma of the highest degree from one of the faculties of a university. It should be pointed out that the M.D. is the basic medical degree in America and is not to be confused with the British M.D.

Taking the above definitions into consideration, it appears that in Britain there are comparatively few people entitled to be called "doctor" for, strictly speaking, the only persons entitled so to call themselves are those who actually hold the degree of doctor, *e.g.*, Ph.D., M.D., D.Sc., D.V.M., etc.

That the courtesy title of "doctor" is bestowed upon medical graduates is a different matter and the writer is unaware how the term came to be applied to graduate medical men in Britain.

Should the veterinary profession, then, decide to grant the courtesy title to its members? Ignoring the fact that members of our sister profession are termed "doctors," are we as veterinarians entitled to the prefix? The only apparent solution to the problem is for the universities to institute and confer a doctorate in veterinary science.

To the lay mind, the terms "veterinary surgeon" and "veterinary practitioner" must be very confusing, the terms giving no indication as to which refers to the graduate man. From this aspect alone, it appears that the conferment of a doctorate would at least distinguish the qualified from the unqualified. Then of course the question again would arise as to the granting of the courtesy title to the present holders of the M.R.C.V.S. diploma.

The 1951 Register of the R.C.V.S. shows that 10 members also hold the degree of D.V.M. Five of these members are resident in Britain and it would be interesting to hear the views of these gentlemen and to learn if they use the term "doctor" to which they are rightly entitled by virtue of the degree conferred upon them.

Harrow (1951) has dealt aptly with the question in respect to the M.R.C.V.S. travelling or residing abroad. The writer has long since given up explaining to clients that he is not a doctor but an M.R.C.V.S. That this confuses the client is obvious, his automatic reply being "but you treat sick animals so you must be a doctor unless you are a quack."

The term "veterinary surgeon" is also somewhat misleading, implying that surgery is the principal work of the M.R.C.V.S. This is untrue in the majority of cases. The term "veterinary physician" seems more applicable, yet there appears little likelihood of its being adopted to the exclusion of the present title. "Veterinarian" seems the most suitable title to use, at least until such time as specialist work leads to post-graduate degrees in the field of surgery, medicine and obstetrics.

Agreement is expressed with the idea that the views of every member of the profession be sought on this point. At least the feeling of the entire profession would be known, but as to the results of any resultant plebiscite I quote Pope's "Who shall decide when doctors disagree?"—Yours faithfully, F. J. Milne, Colorado A. and M. College, Fort Collins, Colorado, U.S.A.

References

Dorland, W. A. N. (1948.) American Illustrated Medical Dictionary, 21st Edit.
Harrow, W. T. (1951.) *Vet. Rec.* **63**, 700.
Pope, Moral Essays, ep iii, **1**, 1.